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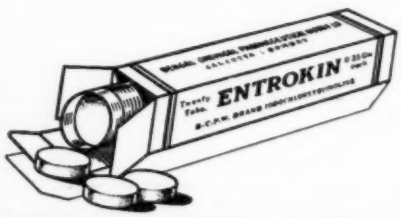

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SUPPLEMENT

Journal of the Indian Medical Association

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THE SIXTH SOUTH INDIAN PROVINCIAL MEDICAL CONFERENCE

The sixth South Indian Provincial Conference was held at Kozhikode on the 5th October, 1951.

Dr. U. Krishna Rau was re-elected as the president of the conference for the second consecutive term. In course of his address, he said the following:

The advent of the new era of Independence raised great hopes in the minds of the people that the sufferings they had undergone for long silently, would come to an end, that an era of health and prosperity would dawn upon our beloved

DR. U. KRISHNA RAU, M.B.B.S.,
President, 6th South Indian Medical Conference.

Motherland. But the course of events that took place as an aftermath of partition consumed all the energy and the resources of Government so much that things had to be allowed to remain in much the same condition. This has unfortunately created in the minds of the people a feeling of despair. Such a feeling of despair, is the greatest enemy to the advance of mankind, and it is the elementary duty of the States, both Central and Provincial, to allay the fears that have taken hold of the people and which are growing deep with every passing day.

Malnutrition and Disease—There is a general impression that the only major preventable diseases are those caused by infection; indeed, there are many countries in which a high standard of health has been attained by concentrating attention almost exclusively on the control of these diseases. This success has given rise to the assumption, ill-founded though it be, that similar results can always be achieved by the prevention of infection, and accordingly the efforts of public health organisations have almost everywhere been directed towards this end. But there are many countries in the world, and India is one of them, where another group of diseases is responsible for more sickness and premature death than all the infectious diseases taken together. This group consists of the types of malnutrition caused by insufficient and unsuitable food. Even a most casual observation of the people of India will show that most of the inhabitants suffer from life-long ill-health and poor physical development which are the results of faulty nourishment. And it is not difficult to establish with abundant evidence that most of the people who die in India of infectious diseases could have survived if their powers of resistance had not been sapped by malnutrition. So that, although the official returns show one or other infectious disease as the cause of death, from the practical point of view the real cause is, in a large majority of cases, malnutrition. In India where malnutrition is a major public health problem, no effective organisations have been set up to measure the harm that it does and to supply expert advice on the measures needed for its control. It is worth mentioning here that in every country in which malnutrition and infectious diseases have been reasonably well controlled, the average length of life has increased to well over 55 years. Seeing that the average length of life in India is less than half this figure, it is clear that the people are sacrificing more than half the period of existence that has been made available to them by Nature. This is not the whole story; the shortened span of life is spent in a disease-ridden and miserable condition. No further evidence is needed to show that the country is already in a state of grave emergency, and the only reason why this has not aroused a sense of alarm and horror is that it has existed for long and so has come to be regarded as the normal condition in India. It is the medical profession that can consider the problem in all its bearings and suggest suitable and effective measures to combat it.

Rural Medical Relief—India, as everyone knows, is a land of villages. A very large majority of the people live in rural areas, and many of the villages are lying far away, remote from civilisation. Though they constitute the backbone of the nation, though they have, by the sweat of their brows, to produce grains, to feed the population of the country as a whole, they are left neglected, uncared for, in spite of official pronouncements that it is the main duty of the State to provide them with their needs. So far as public health and medical relief are concerned, the condition of these people is, to say the least, pitiable. They live in very insanitary surroundings, falling an easy prey to the many viruses that grow and thrive in this congenial soil. And when they fall sick of some disease or other, there are no medical facilities at hand to restore them to health. To

combat this, a scheme of subsidised rural medical relief was introduced in this State in the twenties and it was gradually extended also. But owing to the very low scale of subsidy given to the rural medical practitioners and the humiliating conditions under which they have been forced to work, the scheme has failed to attract practitioners, with the result that many institutions established under this scheme had to be closed down for want of personnel to man them, depriving the people of these localities even the meagre facilities they had so far had. True it is that the subsidy has been increased recently, but it is not commensurate with the needs of the times, and it compares also very unfavourably with the pay of many menials in urban areas. The problem of rural medical relief is such a huge one that, unless all possible measures are adopted, it cannot be tackled satisfactorily.

Medical Education—And this brings to the fore the question of the personnel. It was recently announced in the Press that there was one medical practitioner for every 700 of the population in the United States. Even this has not satisfied the leaders of that great country. They want more and more medical men and women to attend to the needs of the people. But even assuming that we are to provide in our country one medical practitioner for at least 2,000 of the population, many more times the number of the existing practitioners will be required. The number of graduates who come out from our two medical colleges every year is only just a little over the wastage caused by retirement from active practice or death. We have had the cheering news only the other day that two more medical colleges, one in Madura and the other in Guntur, will become an accomplished fact in the near future. From the announcement made in this connection, it is clear that each college will admit only 100 students a year. We cannot say how many will come out successful in the examination after undergoing the long and arduous course of training. Even assuming that all the students come out successful in the end, we can have only 200 more medical graduates every year after the sixth year. Will that be sufficient to meet the needs of the situation? Certainly not. It is because of this difficulty that the introduction of the shift system has been suggested by many members of the profession and by the Executive Committee of the Indian Medical Council. Neither the introduction of the shift system, nor the admission of more students into the medical colleges that has already been allowed by the Indian Medical Council, need necessarily lower the standard of education. What does lower the standard is the method of selection of students for the medical colleges.

Neither a too critical examination of the scholastic grades nor the personal characteristicts of the students weigh with those engaged in the selection of candidates to our medical colleges. What was termed as the Communal G. O. governed their selection till recently. And with the declaration of that G.O. as *ultra vires* of the Constitution by the Supreme Court, a new plan has been evolved which, though not blatantly communalistic, at the same time introduces new, novel and unheard of methods of selection which are bound to seriously affect the standard of our future medical graduates. It is a pity that the Syndicate of the Madras University should have considered the present rationing system a right step toward the equalisation of educational opportunities. There are ways other than rationing which can be adopted for the achievement of the object in view, and the establishment of more and more medical colleges is one of them. But to adopt the rationing system which results in the non-selection of many deserving candidates who would, if selected, in course of time, be ornaments to the profession, is a most retrograde and reactionary procedure which will not only considerably lower the standard but also take away from the favoured young men the incentive to raise themselves to the level of others. This would in the long run do them more harm than good. While the Government stick fast to non-academic principles in the matter of selection of candidates, it is regrettable that they should have turned down the modest request of the Madras Branch of the Indian Medical Association to reserve some seats for the sons and daughters of medical practitioners. They have the tradition inborn in them and they will have also a decent clientele and a well-equipped dispensary to start with. To deny them the opportunity to stay on would result in driving them out of the field to which they have become accustomed and to which they have the aptitude, and this is a serious loss to the society.

I have also one or two practical suggestions to make in regard to the establishment of more and more medical colleges. If after 150 years of medical education at considerable cost of brick and mortar India can produce only 3 or 4 persons of international repute, it is time that we turn to the old ways of education in congenial surroundings at very little cost of brick and mortar. What is wanted is proper teaching and clinical instruction, and these can surely be imparted without a huge outlay on buildings as at present.

Grievances of the Profession—You are all aware that though the independent medical practitioners are rendering an essential service they have not been included in the essential services so as to exempt them from some of the restrictions which greatly impede them in their work. If all the doctors are placed in one category and labour under the same difficulties, it is a matter on which we can raise our united voice. But discrimination has been made between those in government service and the private medical practitioners, that the latter are put to considerable avoidable hardships. I can quote the Madras Rent Control Act as an instance in point. While doctors in government service are exempted from the operation of the eviction clause of the Rent Control Act, private medical practitioners are liable to be evicted if the landlord so wills it. The Government would do well therefore to reconsider their previous order dated 7-7-1951 on the subject and exempt their places of business at least from the operation of the eviction clause of the Rent Control Act rather than leave them in the lurch and ask them to approach the Government as and when they require protection.

Medical and public health problems are assuming more and more importance of late and they are bound to assume still greater importance in the future. It is therefore necessary that the Government should have the help and advice of the members of the Indian Medical Association, the accredited organisation of the practitioners of the Allopathic system of medicine, to tackle these problems. It was therefore a reasonable request that the Madras Branch of the Association made to the Government of Madras that their representatives should be associated with bodies or committees that might be set up to review medical and public health problems. The acceptance of this modest request is a very simple matter, and it would have created confidence in the minds of the medical practitioners that the Government are anxious to avail themselves of their counsel and advice. Though the Government have not turned down this suggestion, their Order dated 6th September 1951 amounts to it in effect. Will the Government lose anything by acceding to this reasonable request and associating members of the Indian Medical Association in reviewing problems in which they are as much interested as the Government themselves? It is not yet too late and I trust the hand of co-operation extended to them will be utilised to the fullest possible extent.

Industrial medicine is assuming considerable importance, and with the growth and development of industries as laid down by the Planning Commission, it is bound to assume still greater importance. The medical officers attached to industrial concerns are, when they exercise their independent judgment as they are bound to do, sure to come into conflict with one party or the other, *viz.*, capitalist or labour. It is therefore necessary and essential, with a view to avoid needless clashes, that these officers should be in full charge of all matters connected with the health of the workers, and certificates granted by them should be made binding on both parties. In case of dispute the matter should be referred to a Tribunal consisting of a senior Government Medical Officer (a senior physician of any of the Government Hospitals in the city of Madras or the District Medical Officer in the mofussil), a representative of the branch of the I.M.A. having jurisdiction in that particular area, and a medical man nominated by the concerned Labour Union, and its decision should be made binding on both parties. Such a satisfactory arrangement will create peace in industry.

The Government of Madras have passed orders prohibiting medical men and women in government service from

being Secretaries or Treasurers of scientific bodies. The reason for this restriction is not understandable. If it is because the Indian Medical Association will indulge in politics that this restriction has been thought necessary, it is at least understandable though not justifiable. But to prohibit government servants as a class from holding either the Secretaryship or Treasurership of a scientific body is a very tall order, unjust in the extreme. It is time the Government of Madras climb down and remove the restriction altogether.

The Sales Tax which was first initiated in this Province during the first Congress Ministry has spread its tentacles far and wide and caused so much hardship to the people in these difficult days that the Government of India have been forced to bring forward an All-India legislation to bring about relief to the whole country. No article is free from this tax and even X-ray photos have now come to be included in the category of articles liable to the levy. Diagnostic X-rays are not, as everyone knows, a commercial commodity. It is therefore necessary that the Government should issue orders to the Commercial Tax Department to keep their hands off the Radiologists.

While we should be thankful to Government for the abolition of different cadres of Assistant Surgeons in their Order dated 9th April 1951, the difference in the scales of pay are still maintained, medical graduates being allowed to start on Rs. 200 in the scale while others who were in Class II are to start in the scale of pay of Rs. 150-25-400, at the next stage above his pay in the old scale of pay subject to the exercise of option allowed under Fundamental Rule 23. This option has to be exercised on or before 31-3-1952, failing which their pay is to be fixed in the new scale of pay with effect from 1-4-1952. This would cause great hardship to non-graduates originally in Class II and requires to be reconsidered. While thus the difference in the cadres of Assistant Surgeons in Government service is sought to be abolished in name at least, the condition of those in the service of local bodies is, to say the least, pitiable. They start on Rs. 80 and the maximum they can reach is only Rs. 150 though they are bound as government servants by the Government Servants Conduct Rules. This is discriminatory and should be remedied forthwith.

Village Vaidya Scheme—It is admitted on all hands that something should be done and that too without dealy to extend medical relief to rural areas. But any ill-conceived plan is bound to make the position worse. In the year 1947 the Government of Madras decided that steps should be taken to accord recognition to the practitioners of the indigenous systems of medicine in the rural areas, to improve their status and to make their services useful to the rural population. Under that plan District Collectors were to select most suitable private practitioners in villages with a population of 1,000 or more for the purpose of recognition as Village Vaidyas or Hakims. These were to be given training in the rudiments of public health and used as public health workers, to be of service to the public. The Indian Medical Association feels, and rightly too, that it is not wise to allow these incompletely trained Hakims and Vaids to practise in competition with Allopathic practitioners. If, however, they are given proper training, there can be no objection to their being used as auxiliary health personnel only.

Honorary System—The overhead charges of administration are increasing day by day and are bound to increase further in course of time. Of the amounts allotted to the Medical and Public Health Departments, a large portion is eaten away by overhead charges, leaving practically very little for equipment of hospitals and purchase of drugs. It was because of this that the representatives of the people urged upon the Government to introduce the Honorary System, as is done in many advanced countries in the West. As a result of the advent of the Congress Ministry the scheme has been given a new life and an announcement has also been recently made that the scheme will be further extended. I therefore earnestly appeal to the Government to extend the scheme fully.

The Planning Commission—The report of this Commission has been before you for a fairly long time and I hope you would have become familiar with its contents. While for the advancement of any nation, planning is necessary, I have at the same time to point out that the subjects of public health and medical relief have not received as much attention as they should have been, in spite of the fact that special committees were appointed for the purpose. As pointed out by ex-President Hoover in his appeal to the American people for funds for medical education, "the efficiency of practically all our industry and commerce to-day is dependent upon the health of their employees and their staffs." Can our planners say that they have kept this basic fact in mind when they prepared their plans? The growth of any industry depends largely on the health of the workers. How can ill-nourished, famished and unhealthy people be able to carry out the plans formulated by the Commission if no steps are taken to assure them positive health? It is time that the attention of the Government is drawn to this vital defect in their plans so that necessary steps may be decided upon.

The Medical Registration Bill—I have reserved to the last the Madras Medical Registration (Amendment) Bill of 1951 now on the legislative anvil. The motion that the Bill be referred to a Joint Select Committee of both Houses has been accepted. It is an irony of fate that when democracy is in full swing in this country, a Bill of such a retrograde character should have been thought of and brought forward, by a veteran in the profession. It was stated some days ago that strong opposition to the proposal contained in the Bill to take away the right so long enjoyed by the Medical Council to elect its own President, and to introduce nomination in its stead, by the medical members of the Council, has gone home, and that the Government have decided to drop the proposal. But the statement made by the Premier who is in charge of the Department that the Government have no such intention whatsoever to his knowledge, makes it obligatory on my part to expose the hollowness of the arguments put forward in support of this highly objectionable and retrograde step. The sponsor of the Bill referred to the history of a previous election to the Council and to the judgment of the High Court in support of his case. Let me assume for argument's sake that serious irregularities had taken place in that election; let me also grant that the objection raised by Dr. Lakshmanaswamy Mudaliar to the collective canvassing of some candidates for seats in the Medical Council is perfectly sound. But I ask whether the deprivation of the Council of its right to elect its own President, which was secured after years of hard struggle, is justifiable? Supposing an elected member of Parliament or a State Assembly commits a serious irregularity. Will it be sufficient justification to deprive his or her constituency of its right to elect its representative? These and other questions arise as a result of the ill-conceived proposal brought forward by the Government. Even in regard to the Registrar, the proposal for a panel can hardly stand scrutiny, despite the arguments put forward in support thereof by the ex-Health Minister. It is a matter for gratification that strong opposition has been voiced to these proposals not only by the members of the profession in the legislature but also by the profession as a whole unanimously. If the Government are wise they should take note of this strong opposition, and drop the Bill altogether.

Our Association—Our parent body is growing in strength day by day. The two Associations in Mysore have merged themselves into one body, thus enhancing the prestige and importance of the Association in that State and adding to the strength of the parent body. But, as is always the case, when an organisation grows in strength, fissiparous tendencies are likely to rear their ugly head for one reason or the other. The relationship of some branches to the parent body is not all that is desired. Some branches are threatening disaffiliation from the parent body. The threatened disaffiliation will not only weaken the branches but also weaken the central organisation to that extent. While therefore a membership drive is needed at the present moment, such fissiparous tendencies are bound to cause serious harm. And the parent body also has not been an organisation in name only. It has to its credit considerable achievements which, but for its ceaseless efforts, would not have been possible. And the journal conducted by the parent organisation is a very useful

publication of which any organisation may well be proud. Those who are attending to the journal work are serving in an honorary capacity, unmindful of the time and labour involved in the task. It is therefore necessary that members of the Association, recognising its usefulness and its power to do good, should voluntarily come forward to make further contributions to the common cause so that the Association and its accredited organ may grow from strength to strength and achieve their aims.

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Resolutions passed at the open session of the 6th South Indian Provincial Medical Conference held at Kozhikode on 7-10-1951.

1. This conference places on record its deep sense of sorrow at the demise of the following members and conveys to the members of the bereaved family its sincere condolences.

(*i*) Doctor P. Venkaragiri of Madras branch.

(*ii*) Doctor M. S. Raghavendra Rao of Tanjore branch.

(*iii*) Doctor P. S. Mannadiar of Nilgiris branch.

2. This conference is of opinion that Joint Provincial Conference of Andhra and South Indian Branches may be arranged, instead of separate conferences with great advantage to the members of our profession and requests the Executive of the South Indian Provincial Branch of the Indian Medical Association to take steps towards this end. Referred to the Joint Standing Committee.

3. This Conference requests the Executive of the South Indian Branch of the Indian Medical Association to depute a responsible and enthusiastic member of the Executive Committee to tour its area and in co-operation with the local branches to try and enrol all medical men as members of the Indian Medical Association and start new branches of the I.M.A., in places which justify the same. Referred to the Provincial Council.

4. This Conference requests the Government of Madras to recommend to the Central Delimination Committee and take such other steps as are necessary to include Licentiates and diploma holders possessing registerable qualifications as defined in the Indian Medical Degrees Act IV clause 2 (7 of 1950) in the graduates constituency for the purpose of election to the Madras Legislative Council, as has been done by the Bombay State Government.

5. This Conference is of opinion that in view of the useful work done by the Rural Medical Practitioners, the Government is requested.

(*i*) to raise the subsidy from its present rate to Rs. 1,800/- per annum;

(*ii*) to remove the distinction between the Graduates and Licentiates in the service with regard to subsidy and other privileges.

The Conference authorises the President, the Secretary and three representatives of the Rural Medical Practitioners to be chosen by the President to wait in deputation on the Government and submit a memorandum putting forth the grievances.

6. This Conference requests the Government to make no distinction between Graduates and Licentiates in the matter of granting certificates of physical fitness to candidates appearing before the Public Services Commission for employment under Government service and for employment under local bodies.

7. This Conference reiterates the resolutions passed previously at Mangalore and Annamalainagar that the pay, privileges regarding leave etc., and emoluments of Local Board Medical Officers should be raised to the level of those in Government service and requests the Government to implement these resolutions. It also requests the Government to receive a deputation.

8. This Conference is of opinion that all Medical men both in service and private practice should be classified as members of the 'Essential services' and for purposes of Rent Control Act.

9. This Conference is of opinion that the Madras Medical Council Act amending bill of 1951 which the Madras Government has introduced in the legislatures and which has now been referred to a Select Committee of both houses of legislature is a retrograde measure affecting the Medical profession vitally in many matters and requests the Government to withdraw the bill entirely.

10. This Conference is of opinion that the proposal of the Government to levy 'Sales Tax' on X-ray photos is not fair, as the taking of an X-ray is not a sale and it requests the Government to drop this levy.

11TH BENGAL PROVINCIAL MEDICAL CONFERENCE

The 11th Bengal Provincial Medical Conference was held at Behala (24 Pargana) on the 15th and 16th December, 1951.

The conference was inaugurated by Dr. N. R. Sengupta, who in course of a short speech narrated the growth and development of the I.M.A. and wished success to the organisation.

Dr. B. B. Sen the Chairman of the Reception committee welcomed the guests and in course of his speech referred to the importance of manufacture of Biological products in India. He said, "In free India, medicine should not be imported from outside as far as practicable." He also suggested the formation of a number of councils on different medical subjects to control, accept or reject new and non-official drugs put on the market. He also referred to education in pharmacy which needed earnest attention of the conference.

Dr. J. C. Banerjee, the president of the conference in his address discussed the various medical problems of the

DR. J. C. BANERJEE, M.D., M.R.C.S. (ENG.), M.R.C.P. (LOND.)
THE PRESIDENT OF THE CONFERENCE

day. He began with medical education and said," The object of under-graduate medical education is to train up a

basic doctor—one who would have to take up both curative and preventive work. For this purpose it is necessary that the bearing of environments, housing accommodations, habit, customs, diet and water supply, on the health of a community have to be studied by the prospective doctors of to-day.

A Medical Student must have a broad general education. He must have a knowledge of the literature, English and Vernacular,—Mathematics—particularly in relation to statistics—Physics, Chemistry—Inorganic and Organic—and Biology. In the clinical course emphasis has to be laid on the importance of Social Medicine. In the study of diseases the attention of the student should be directed to the importance of the Psychological factors in the production of symptoms and signs. Didactic lectures have to be curtailed and the number of clinical demonstrations in the wards have to be increased. No proper clinical teaching is possible if one teacher has to impart clinical instructions to a group of about 30 students or even as many as 60 students as at present practised in the medical institutions of Calcutta. In any planning for the improvement of medical education the student to teacher ratio is the prime consideration and yet we find the Government does not appear to have given due consideration to this question.

We have been noticing of late that the students are being over-burdened with specialised teaching at the cost of general clinical medicine. This trend is not salutary. Details of specialised knowledge should be left for the post-graduates only.

Ayurvedic Education

Recently the Chopra Committee set up by the Government of India recommended a synthesis of the Western and Ayurvedic systems of medicine. At a conference of Health Ministers of all the State Governments held in New Delhi in September, 1950 it was suggested that both in the Diploma and Degree courses in Ayurvedic Medicine the basic sciences —Physiology, Anatomy including Radiology, should be taught to the students. We are of definite opinion, as the Indian Medical Association has already pointed out, that the study and research on Ayurvedic system of medicine should be taken up by post-graduates who have developed a maturity of the mind and are specially suited for the purpose.

Post-Graduate Medical Education

Now comes the question of post-graduate medical education. The establishment of a Post-graduate Medical College is long overdue. There is no arrangement for training of the post-graduates for the higher degrees and diplomas. For the lack of such an institution a large number of our students has to go abroad at considerable expense for the higher diplomas in various subjects. The deserving students should have adequate teaching facilities and be encouraged to have degrees and diplomas here. It is only after the acquisition of such higher degrees or diplomas that the Government should award Travelling Fellowships to meritorious students for a short period of 6 months to a year so that he may gather a first hand experience on the modern advancements in various branches of Medicine, Surgery and allied subjects. It is, however, essential that on their return from abroad they would be provided with suitable posts in the Government Teaching Hospitals so that their valuable services may be utilised for the good of the public. Instances are not lacking where the Government has not utilised the services of such trained personnel.

Another scheme, that I venture to suggest is worth consideration by the Government. Eminent teachers from U.K., U.S.A., and the continent should be persuaded to come to 3 or 4 centres of Medical Education in India, such as Calcutta, Bombay, Madras and Lucknow for about a year at least and their specialised knowledge and skill should be utilised in the training of various teams, some working in Cardiac Surgery, some on Neuro-Surgery and some on advanced Chest Surgery. In this connection the Association extends its grateful thanks to the Chief Minister Dr. B. C. Roy, for opening at a cost of about Eighty-thousand Rupees the Electro-Encephalography Department in the Presidency General Hospital as a nucleus for investigation of Brain Diseases and research thereon.

It is the intention of the Government to set apart the Presidency General Hospital for purposes of a Post-graduate teaching in various branches of medicine and surgery. We hope that opening of various other units for medical research, nutrition research, chest surgery, neuro-surgery, orthopædics, and Physio-therapy etc., would follow in near future and our long-cherished dream of a first class Post-graduate Medical College and Hospital in Calcutta would come true. May we hope also that a research unit on Ayurvedic system of Medicine should be attached to this Post-graduate College where the merits of various indigenous drugs and preparations may be assessed by careful clinical trials under the guidance of a Therapeutic Trial Committee?

Another object of Post-graduate Medical Education is to arrange refresher courses for the general medical practitioners particularly of the rural areas, for a period of 6 weeks at intervals of 3 to 5 years. During this period of training the Government should partly bear the requisite expenses.

Medical Research

The Government of West Bengal has not allotted any specific sum to the Medical College, Calcutta for the creating of a Research Fund. The days of individual research work are almost over. So we appeal to the Government to establish Research Funds with adequate grants to the Government Medical Colleges. The Non-official Medical Colleges also should have similar funds.

Medical Relief

This problem may be divided in two parts:—(*a*) Urban Medical Relief and (*b*) Rural Medical Relief. Calcutta's population is now near about 32 lacs. The number of available bed is about 1·5 per 1,000 of population in Calcutta. This is too low in comparison with corresponding figures in U.K. (8 per 1,000) and In U.S.A. (11 per 1,000). Yet in the face of this shortage of beds the Government has not taken steps to maintain the Lake Medical College and Hospital with 700 beds. The Bengal Provincial Branch of the I.M.A. sent some time ago a deputation to wait upon the Hon'ble Dr. B. C. Roy, the Chief Minister, to suggest ways and means to maintain the Institution. But the Chief Minister said that without the help of the Central Government it was not possible for the West Bengal Government to shoulder the heavy burden. Still we feel that the Government should have devised ways and means to maintain the Lake Medical College and Hospital for two main reasons, (1) first, it would have provided a training centre exclusively for the Condensed M.B. Course Students and (2) secondly, it would have served to a great extent the medical need of the ever-growing population of the southern part of the city due to influx of a large number of refugees.

Rural Medical Relief. It is well-known that the vast majority of the rural people are denied the facilities for proper and upto date medical relief. For lack of the modern amenities of life in the villages the medical practitioners, whose number is already inadequate to meet the medical needs of province, concentrate in the towns and cities. We think that the Government should encourage the young doctors to go to the villages by paying them adequate salaries and subsidies.

On the basis of the Bhore Committee's recommendations the Government of West Bengal should have opened 1040 Health Centres (One centre for 2 Unions with a population of 20,000). The plan of the Government however was to open 306 such centres by 1951. So far as we know only 115 (including 15 Thana Hospitals) Health Centres have been set up uptill now. The progress is very slow and the Association would emphasise upon the Government the necessity of giving this problem a top priority.

The Medical and Public Health problems have to be viewed as a whole. The object of Free India is not merely the cure of diseases, nor its prevention, but the development of positive health. This can be achieved only by an Integrated Health Planning on an an All-India basis with the co-operation of all the State Governments, for increased food

production, dietary survey, standardisation of diets, maternal and child health and industrial health and control of population by family planning.

Drugs and Equipments. During the last 17 years there have been some phenomenal discoveries in the medical science in the field of therapeutics—such as Sulfa Drugs, D.D.T. and the various Antibiotics *viz.*, Penicillin, Streptomycin, Chloromycetin, Terramycin, and Neomycin. The search for other antibiotics is going on and in near future the medical man may be the proud possessor of more effective weapons in his fight against diseases. Yet another field of therapeutic activity has opened. I mean the role of Radio-active isotopes in the treatment of Exophthalmic Coitre, Leukæmias and Malignant Tumors.

There has also been rapid advancement in various equipments for the diagnosis and treatment of diseases.

The Electrophonocardiograph for the diagnostic interpretation of heart sounds and murmurs, Angiocardiography for the visualisation of the heart and blood vessels, the Electro-encephalograph for the diagnosis of Epilepsies and Intracranial Tumours. Recordings of heart sounds and murmurs are being made with a specially designed microsphone for teaching medical students in large groups. But these essential drugs and valuable equipments mentioned above have all to be imported from foreign countries at a huge cost. Attempts, therefore, should be made by the Central Government to instal plants for the preparation of various antibiotics so that India may not be deprived of such essential supplies from the foreign countries in case of a global war. We welcome in this connection the move of the Central Government to instal a Penicillin Factory in India at an estimated cost of 2 crores of Rupees with the technical assistance made available by the World Health Organisation and a financial help from the United Nations International Childrens' Emergency Fund to the extent of about 4 lacs of Rupees. The various modern electro-medical equipments should also be manufactured in India and W.H.O. may be approached by the Central Government for similar technical assistance and financial help.

Assay of Indigenous Drugs and Preparations, and their Therapeutic Trials. The general Medical Practitioners are hesitant in the use of various indigenous drugs. It is imperative that these indigenous drugs and preparations must be manufactured according to accepted pharmaceutical standards and then assayed in Central Drugs Laboratory and Pharmacognosy Laboratory, Government of India, Lucknow. Thereafter the preparations have to be treated under the guidance of the Therapeutic Trials Committee. It would be well if the various pharmaceutical concerns would award Fellowships for assessment of their preparations in the various teaching institutions as the Standard Pharmaceutical Works has done in the Medical College Hospital, Calcutta.

We understand that valuable results have been obtained by research on about 300 Medicinal Plants in India under the auspices of the Council of Scientific and Industrial Research. The Central Government has already published an Indian Pharmacopœial list but the publication of an Indian Pharmacopœia comprising amongst others an exhaustive list of useful and standardised indigenous drugs and preparations is still being awaited.

Our duties: This Provincial Branch has performed a good deal of constructive work in the past years such as medical relief and rehabilitation of displaced doctors, a uniform scheme of medical services on All-India basis, preparation of a comprehensive list of Essential Drugs and Scientific Appliances for inclusion in the O.G.L., by the Government of India, suggestions to the Calcutta University Enquiry Commission regarding improvement in Medical Education and Examination, suggestions to the Government on proposed scheme of Prohibition in West Dinajpur and Malda District, suggestions to the Drug Licensing Officer, West Bengal Government regarding renewal of Drug License by the practitioners and the procedure of deposition of fees, 'memorandum to the Indian Tea Planters' Association and Indian Tea Association for improvement in the service conditions of the Tea Garden Medical Officers. Besides, this Provincial Branch selected and recommended 4 candidates to the Central Office for Residencies in hospitals in U.S.A. and Canada, so ably arranged by the untiring efforts of Dr. S. C. Sen, the Hony. General Secretary of the I.M.A. Two of them were finally selected for training in Mount Sinai Hospital. A Sub-Committee of this Provincial Branch has been preparing a curriculum for the M.B.B.S. course.

But I feel that it is not enough. We have to do more. The following suggestions are put forward with a view to popularise the Association by bringing about more intimate contact with the general practitioners and the public:—

1. This Provincial Branch should create a Doctors' Benefit Fund. It is intended for giving relief to the wives and children of deceased members.

2. This Provincial Branch should form a Nucleus of Relief Fund. This is to be utilised for the relief and rehabilitation of Doctors in distress.

3. Under the auspices of this Provincial Branch, Anti-epidemic squads should be formed at once for carrying out preventive measure including vaccination in different wards of the City and its suburbs.

4. This Association should take up the question of establishing Polyclinics under its auspices, to render efficient medical services to middle class people at cheaper rates.

5. The Association should seriously think whether it could start a scheme of Mobile Hospital Service for the poor people. It is interesting to learn that People's Mobile Hospital is doing very useful work in Bombay and its suburbs within 20 miles of the city.

6. This Association should devise ways and means to create a Fellowship under its auspices to be awarded to meritorious candidates who would have to work in recognised teaching institutions under the supervision of a recognised teacher just as the Cardiological Society of India has done.

7. Expert Committees should be set up by this Provincial Branch to publish on its behalf popular booklets on modern methods of diagnosis and treatment of commoner diseases prevailing in this Province.

8. Members of this Provincial Branch should be persuaded to visit the different Mofussil Branches to deliver Clinical Lectures for promoting social contact and exchange of ideas amongst themselves.

These humble suggestions of mine, I, hope, would receive your close and careful consideration.

• • • • •

The following Resolutions were passed at the Conference.

1. *Health Problem*: This Conference views with great concern the present deplorable and gradually deteriorating health condition of the province. Incidence and rate of mortality from the preventable diseases are on the increase. The number of hospital beds and properly equipped State treatment centres falls far short of the requirement. A large number of qualified medical men, inspite of their will and efforts to render service, are denied opportunities to be utilised, and have to remain idle and unemployed, because of the lack of a well-planned and comprehensive health policy of the State, while the people who are impoverished, ill-fed, ill-clad and ill-housed, are in need of medical care more than ever before. This Conference urges upon the Government to build up a comprehensive Health Service for the State giving it a top priority, along the lines of recommendations of the Bhore Committee as amended by the Indian Medical Association.

2. *Lake Medical College and Hospitals*: This Conference strongly disapproves of the deliberate closing down by the Government of India and West Bengal, such a useful and well equipped Hospital as Lake Medical College and Hospitals inspite of repeated representations from the profession and public, betraying a complete lack of realisation of the present health needs of the people and of the necessity of a separate institution for the training of condensed M.B.B.S. course students. This Conference considers that the so-called dispersal scheme of the Government of West Bengal is no

substitute for the Lake Medical College and Hospital and is merely a make-believe to console the people. So this Conference urges upon the people and the Government to see that this institution is not abolished against the will of the people.

3. *Pre-Clinical Course in the Undergraduate Medical Curriculum*—This Conference views with deep concern that attempts are being made by the Indian Medical Council to shorten the pre-clinical course in the undergraduate medical curriculum and recommends that the period of study of the pre-clinical course should not be less than two years. This Conference further recommends that provision should be made both in the pre-medical science course as well as in the pre-clinical courses for the study of basis sciences upto an adequate standard as recommended by the Indian Medical Association, and that under no circumstances should the requisite period of academic training for the undergraduate course be less than 5 years as at present.

4. *Medical Curriculum*: This Conference notes with appreciation that a Special Committee of experts has been set up by the Bengal Provincial Branch of the Indian Medical Association to draw up a detailed curriculum of undergraduate medical course, and that a substantial progress has already been achieved in that direction. This Conference recommends that the Medical Faculty of the Calcutta University should revise the existing curriculum in consultation with the Bengal Provincial Branch of the Indian Medical Association.

5. *New Set-up in Medical College, Calcutta*: This Conference notes with pleasure that the Government of West Bengal have accepted the principle of appointing whole time Directors in the clinical subjects in Calcutta Medical College. In the appointment of professors and assistant professors however, this Conference views with concern that the proposed number of teachers, as evidenced from the number of posts advertised so far, is quite inadequate to maintain a proper teacher: student ratio as recommended by various expert committees on medical education, both in India and abroad. In this connection, this Conference notes with regret that in spite of repeated requests from the Indian Medical Association and the Public, the Government of West Bengal have not yet disclosed their final plan of the "New Set-Up" in the teaching staff of the Calcutta Medical College. This Conference further notes that in the proposed "New Set-Up" as advertised, undue stress has been laid on specialities instead of on General Medicine and Surgery which, this Conference feels, will not be beneficial to the training of undergraduates, a large number of whom will after qualification, engage in general practice. This Conference, therefore, requests the Government of West Bengal to re-consider the entire plan in the light of the scheme on medical education prepared by the Indian Medical Association with the help of the Special Committee of experts set up by the Bengal Provincial Branch of the Indian Medical Association.

6. *Advisory Committee in Different Hospitals*: This Conference is of opinion that a system of non-official Advisory Committee should be adopted in all Government and Public Medical Institutions and Hospitals including the District Sadar Hospitals, Sub-Divisional Hospitals, Thana and Union Health Centres, Special Tuberculosis or Leprosy Hospitals, and that representatives of the local branches of the Indian Medical Association be included in such committees.

7. *Spurious Drugs*: This Conference views with great concern that spurious, faked and unstandardised drugs are being freely sold in the market without any serious attempt on the part of the Government to put a stop to such practice. This Conference re-iterates the importance of (i) immediate implementation of the Drugs and Pharmacy Act in its entirety (ii) making the sale and manufacture of spurious drugs a cognisable offence; (iii) and of suitably amending the Act so that severe and deterrent punishment may be meted out to the offenders.

8. *Post-mortem Examinations*: This Conference recommends that in view of the supreme importance of autopsy studies for the advancement of medical knowledge and research, post mortem examinations be made compulsory in public hospitals in all cases of death whenever or wherever considered necessary. Further resolved that the Indian Medical Association and the medical profession shall try their best to create public opinion in this matter. The Conference further urges upon the Government to make suitable arrangements for the proper disposal, if necessary, of autopsied bodies at Government cost, due regard being given to the religious practices of the people.

9. *Mismanagement in Refugee Camps*: This Conference records its great disappointment at the utter mismanagement prevailing in the Refugee Camps which are not only infernes of suffering for the refugees but are colossal breeding grounds of various diseases and that they perpetually act as potential reservoirs for spreading infections to the city. This Conference therefore urges upon the authorities concerned to look into the matter with the sympathy and seriousness that it deserves and to accept and give effect to the recommendations already made and forwarded to them by the Calcutta Branch of the Indian Medical Association.

10. *Rural and Union Health Centres*: This Conference feels that in opening the different Rural Health and Union Health Centres as well as in reconstituting the District and Local Board Health Services, the Government should first absorb in suitable posts the registered medical practitioners who are already in service in these institutions, giving them a Refresher Course, if necessary, while making appointments in the medical staff of the respective centres.

11. *Tea Plantation Labour Bill and Medical Officers in Tea Gardens*: In view of the Plantation Labour Bill recently enacted by the Indian Parliament, by which the medical men serving under the Tea Plantation have been excluded from the purview of the Act and consequently debarred from the privileges and provisions of the Trade Union Act, this Conference urges upon the Plantation authorities to implement the recommendations of the Indian Medical Association, Bengal Provincial Branch, in regard to the duty hours, scale of pay, security of services and other amenities and interest of the medical officers serving under them.

12. *World Peace*: This Conference views with great alarm the threat of another World War and application of atomic, bacteriological and other weapons of mass destruction. The members of the medical profession being healers, highly value peace and life. So, this Conference strongly registers their moral disapproval of such wanton destruction of life and urges upon the Government to take firm steps in national and international field to safeguard peace and save the people from the nefarious designs of the Warmongers and ban the use of atomic and bacteriological and other weapons for mass destruction and appeals to the people of the world to work for peace.

13. *Essential Drugs and Basic Chemicals*: The progress of Chemical and Pharmaceutical Industries and manufacture of medicinal drugs in this country is suffering immensly from want of basic chemicals. This Conference urges upon the Government of India to take up manufacture of basic chemicals as a nationalised industry without delay so that India may, with her immense natural resources, be self sufficient in all essential drugs and chemicals.

14. *Refresher Course*: This Conference recommends that in the interest of increasing the efficiency of the medical practice specially in the rural areas, short Refresher Courses be arranged in different teaching centres of the State and rural practitioners be encouraged to utilise the course.

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BARRACKPORE BRANCH—A special meeting of the branch was held on 27-1-52 to condole the sad and sudden death of Dr. S. N. Nandi, the president of the branch. A copy of the resolution was sent to the family of the deceased.

Dr. S. N. Nandi was born in 1883 at Halisahar, 24 Prgs. He graduated from the Medical College, Calcutta in 1906. After an independent practice for nearly 11 years he accepted service as Health Officer at Ranchi Municipality, next at Howrah District Board. He retired in 1940. He was the author of two Bengali Dramas which were well received by the public.

BEHAR PROVINCIAL BRANCH—The first meeting of the working committee of the branch was held on the 27th

January, 1952. Dr. S. K. Ghosh Dastidar, presided. The committee condoled the sad death of the following; (*a*) Rai Bahadur Dr. T. C. Guha, (*b*) Dr. Hiralal, (*c*) Dr. Pabitra Kumar Shome. It was decided to invite the 28th All-India Medical Conference to Behar in December, 1952.

BENGAL PROVINCIAL BRANCH—The annual report of the branch for the year ending on the 30th Sept.-51, shows that four ordinary meetings of the council were held during the year. The working committee met once every month. Six standing committees were appointed to facilitate treatment of different problems arising in course of the year. As a result of membership drive, one hundred and forty five new members were enrolled at the beginning of the session. Five new branches were formed.

BERHAMPORE BRANCH—The 5th Orissa State Medical Conference will be held at Berhampore on the 11th, 12th and 13th of April, 1952. A Scientific section has been organised where clinical papers will be read and discussed. An exhibition also will be held on this occasion.

* * * * *

In a meeting of the branch held on 20-12-51, the members condoled the sudden and untimely death of Dr. Niranjan Das.

* * * * *

In a meeting of the branch held on 22-1-1952, the annual function of the branch was postponed till the Orissa Medical Conference is over. Dr. K. Satyanarayan Rao, spoke about "Strangulated Hernia in relation to general practice."

BHOWALI BRANCH—A general meeting of the branch was held on 24-1-1952 with Dr. Khazan Chand, in the chair. An article on "Incidence of Pleural Effusion in Artificial Pneumo-Thorax—a statistical study" by Dr. Khazan Chand, and Dr. Bir Chand Arora, was read.

CACHAR BRANCH—A meeting of the branch was held on the 26th January, 1952 with Dr. A. T. M. Glen, in the chair. Twenty five members were present. Dr. S. Chakraverty, read interesting case notes.

CALCUTTA BRANCH—The first meeting of the Executive committee of the branch was held on the 15th January, 1952. Nineteen members were present. Applications for membership were considered and eleven new members were enlisted. Six Sub-Committees were formed, (1) Medico-political, (2) Scientific, (3) Public health, (4) Library, (5) Social and entertainment, (6) Publicity.

Representatives to the Bengal Provincial Council for 1951-52 were also elected.

COCHIN BRANCH—In a meeting held on 25-1-52, Dr. B. D. Mallaya, was elected Hony. Secretary for the year 1951-52 in place of Dr. S. S. Rao.

CUDDALORE BRANCH—In a meeting of the branch held on 24-11-1951, Dr. (Mrs.) K. Parukuttiraman, spoke on problems in Obstetrics. Dr. P. V. Vaidhinathan, was in the chair.

DELHI BRANCH—Dr. S. K. Sen has been elected the president and Dr. Ved Prakash, the Secretary of the branch for the year 1951-52.

FARRUKHABAD—FATEHGARH BRANCH—The annual report of the branch shows that nine general meetings and seven clinical meetings with film demonstration were held during the year. The branch decided to have its own building and plan was prepared for sanction.

Office-bearers for 1951-52 were elected with Dr. Amba Pershad, as president and Dr. J. N. Saxena, as Secretary.

FEROZEPORE BRANCH—A meeting of the branch was held on 5-2-52 with Dr. Raja Ram Bhola in the chair. Eighteen members attended. Dr. C. P. Khanna, read a paper on "Urine in health and disease."

JEHANABAD BRANCH—The annual meeting of the branch was held on 9-12-51. Ten members were present. Office-bearers for 1951-52 were elected with Dr. R. K. Prasad, as president and Dr. R. L. Verma, as Secretary.

A monthly meeting of the branch was held on 3-1-52 with Dr. R. K. Prasad, in the chair, nine members were present.

KANGRA BRANCH—An emergent meeting of the branch was held on the 13th February, 1952 to condole the sad and untimely death of Dr. Des Raj Sapra, the senior medical officer of T. B. Hospital, Chetru and a member of the Association.

KOTALPUR BRANCH—In a meeting of the branch held on 6-2-52, a resolution postponing the consideration of the draft rules framed by the Ad-hoc committee till the next annual meeting, was unanimously adopted.

PORBANDAR BRANCH—A clinical meeting of the branch was held on 27-1-52 with Dr. H. H. Chavda, in the chair. Sixteen members were present. Dr. C. V. Mankad, read the case report on the operation of "Exopthaimic Goiter." Next a talkie film on "Control of Filariasis was shown.

RANCHI BRANCH—In the annual general meeting of the branch held on 25-1-52, Dr. S. N. Sinha, was elected the president and Dr. A. K. Ghosh the Secretary of the branch for the current year.

SHIMOGA BRANCH—The monthly meeting of the branch was held on the 9th February, 1952 with Dr. C. Gopalaraj Chetty in the chair. The following subjects were discussed,

1. Symposium of Dysenteries.
   (*a*) Introduction by Dr. D. Krishna Murthy.
   (*b*) Dysenteries and the general practitioner by Dr. S. Gurumurthy.

TIRUCHY BRANCH—The 23rd Inaugural meeting of the branch was held on the 10th December, 1951 with Dr. R. Kalamegham, in the chair. Fifty members were present. Dr. P. Arunachalan, gave an interesting talk on Rheumatic Fever.

FIFTH ORISSA STATE MEDICAL CONFERENCE

BERHAMPORE (GANJAM)

The fifth Orissa State Medical Conference will be held at Berhampore (Ganjam) on the 11th, 12th and 13th April, 1952. Members of the Medical profession, especially of the Orissa State, are requested to attend the conference to make it a success.

An exhibition of Pharmaceutical products and and Medical instruments etc., will be held on the occasion. A Scientific section is also being organised. Members of the Medical profession are requested to send their papers for same.

For further particulars, please apply to the Organising Secretary, Venkateswar Temple Street, Berhampore (Ganjam).

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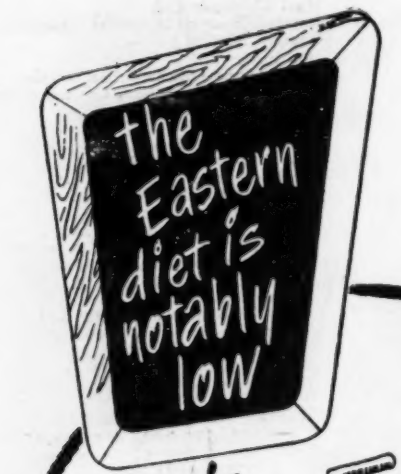

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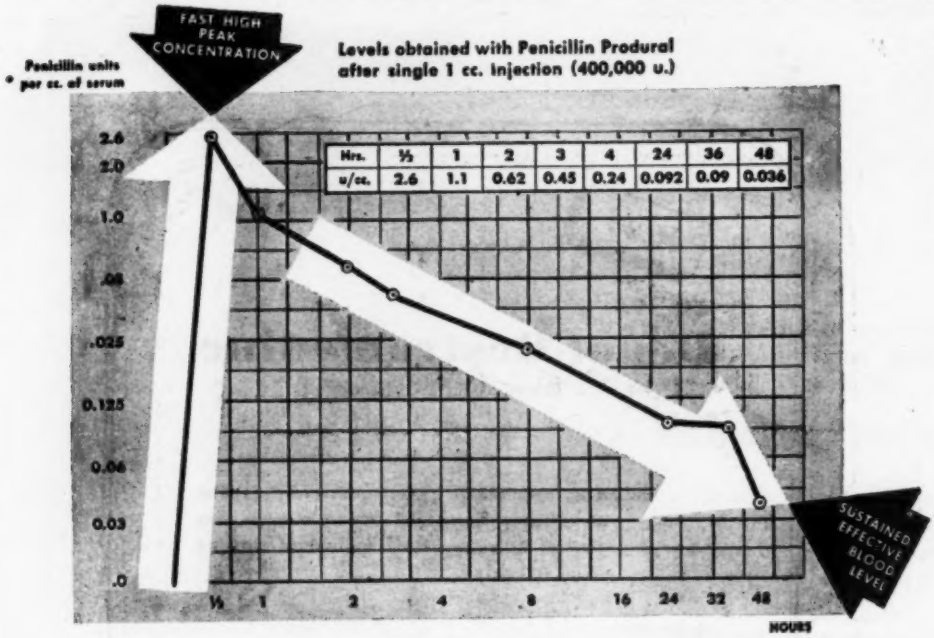

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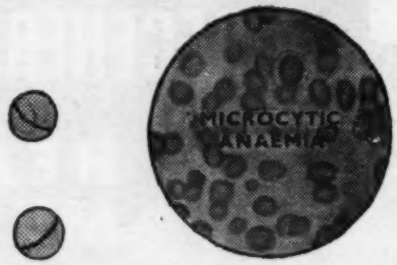

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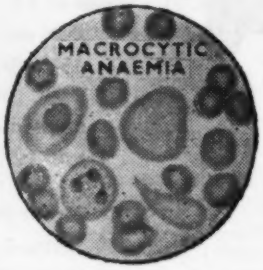

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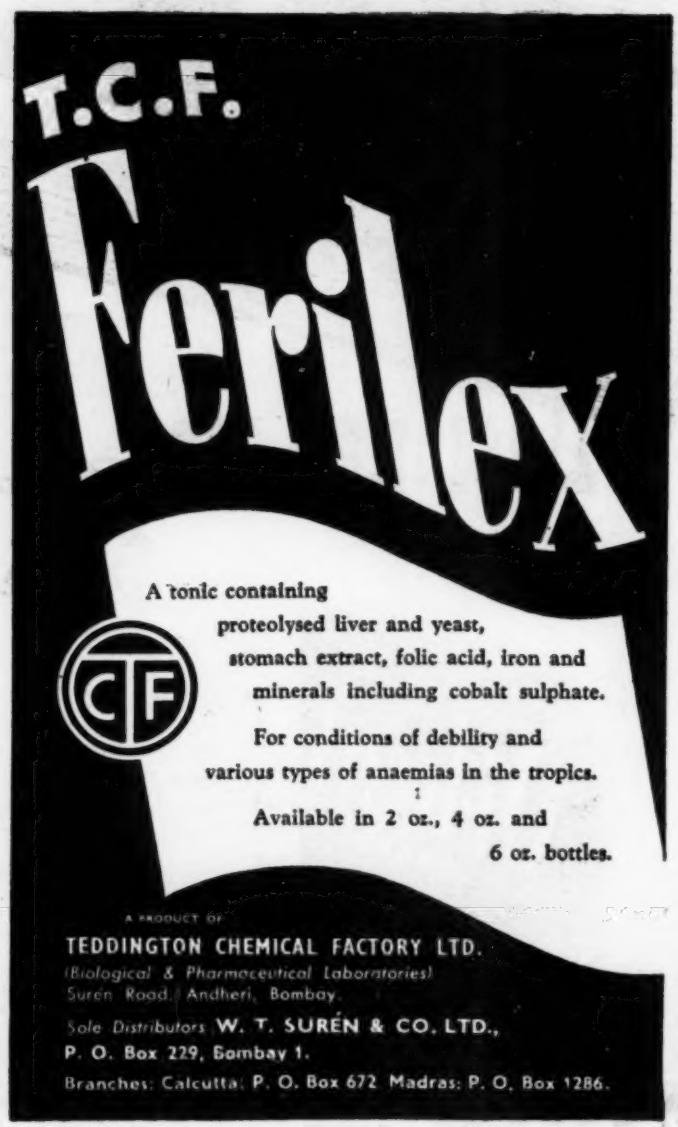
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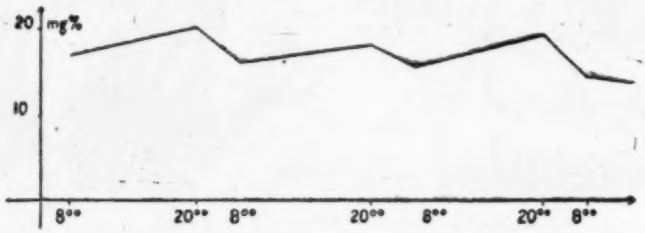

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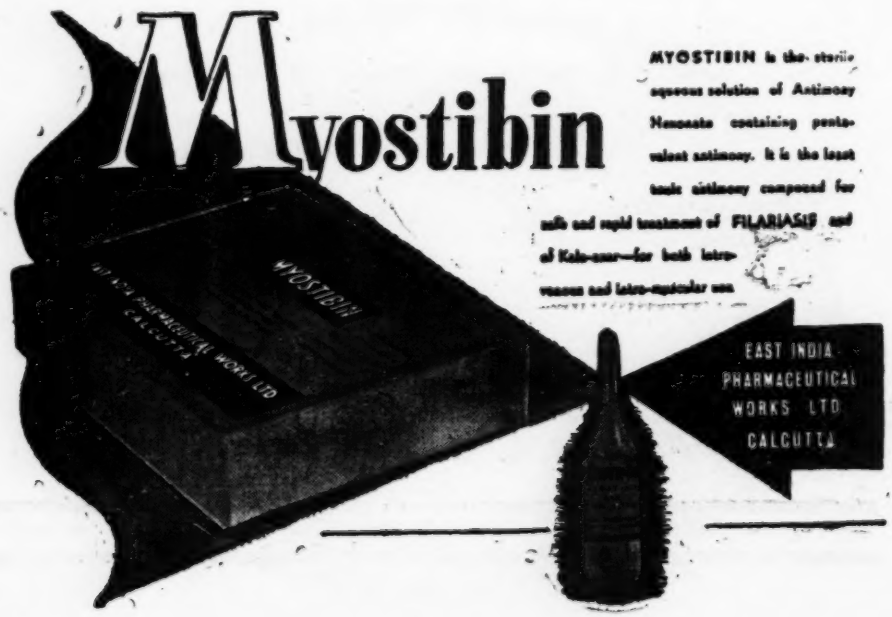

Journal of the Indian Medical Association

VOL. XXI. No. 7 CALCUTTA APRIL, 1952

ORIGINAL ARTICLES

STUDIES ON CARBOHYDRATE METABOLISM IN TOXAEMIA OF PREGNANCY

3. SUGAR MOBILISATION IN TOXAEMIA OF PREGNANCY

CHUNILAL MUKHERJEE,

Professor of Obstetrics and Gynæcology, Nil Ratan Sarkar Medical College, Calcutta

Autopsy findings in the liver in toxæmia of pregnacy often suggest that this organ may be deficient in its store of glycogen. But, adequate proof in this direction is not yet available. Investigations on carbohydrate metabolism, reported earlier (Mukherjee, 1952), and the results of glucose tolerance tests merely point to a delayed utilisation (and probably storage) of sugar in pregnancy toxæmia. Therefore, the belief that the hepatic store of glycogen is reduced in toxæmia of pregnancy requires further scrutiny. In the present investigation this has been done with the aid of adrenalin. It is known that administration of adrenalin in normal persons causes the blood sugar to rise rapidly, often to the extent of provoking glycosuria. It is also known that this hyperglycæmia results from hepatic glycogenolysis, the muscle glycogen being not normally affected in this process (Bollman, *et al*, 1925: Collens *et al*, 1926). Moreover, Sucksdorff (1930), Loeb and co-workers (1931), and several other observers have shown that in diseases of the liver the rise in blood sugar after an injection of adrenalin is less than usual. This forms the basis of the experiments which form the basis of this communication.

METHOD AND MATERIALS

Every patient in this series, normal or otherwise, was kept in basal conditions with a rich carbohydrate meal on the night before the test. The experiment was done in the morning two hours after a breakfast consisting of sweet tea, toast and golden syrup. Immediately before the test the blood pressure was taken every 30 seconds until three consecutive readings for both systolic and diastolic pressures were constant. At this stage, venous blood was collected for the estimation of the basic blood sugar level. An injection of 0·5 ml. of adrenalin was then given intramuscularly, and 20 minutes later a second sample of blood was obtained for the determination of its sugar content. The interval of 20 minutes was decided upon from a preliminary study of 26 cases of normal pregnancy, where the blood sugar was estimated every 5 minutes after the injection in order to obtain the point of maximum rise in blood sugar caused by the injection. The difference between the basal and the post-adrenalin blood sugar value was accounted for by the mobilisation of hepatic glycogen caused by adrenalin, and is described here as the sugar mobilisation index. The manner of collection of blood, the method employed for the prevention of glycolysis, and the technique adopted for estimation of blood sugar have been described in a previous communication (Mukherjee, 1952).

The materials consist of 197 cases. Of these, 16 were normal healthy women volunteers between the ages of 21 and 30 years. They were all either medical students or nurses. The results provided the normal controls. There were 53 cases of normal pregnancy in this series, all belonging to the last trimester of gestation. The reason for such selection will be found later. The total number of cases of toxæmia studied was 128. Of these, 100 were pre-eclamptic patients, and 28 were cases of eclampsia. Pre-eclampsia was divided into two groups, mild and severe. This distinction was to some extent arbitrary, and in absence of any accepted standard, was based on the blood pressure levels of 150 mm. Hg. systolic, and 90 mm. Hg. diastolic. The comparatively small number in the eclamptic series is due to the fact that this analysis includes only those cases where the test was performed within two hours of the last convulsion, if not actually during the convulsive stage (shown by the subsequent history of the patient). For obvious reasons elaborate preparations described above were not feasible in these cases. However, each patient received 100 gm. of glucose intravenously three hours before the test was performed.

RESULTS

1. *Normal Pregnancy*—As the object of the present investigation was to determine the changes which occur in toxæmia of pregnancy, cases of normal pregnancy selected for study were only those between 29

and 40 weeks of gestation. The data presented here are based on 83 tests done on 53 patients (Table 1).

TABLE 1—FREQUENCY DISTRIBUTION OF THE SUGAR MOBILISATION INDEX IN NORMAL PREGNANCY AND PRE-ECLAMPSIA

mg./100 ml. Frequency	Normal Pregnancy	Mild Pre-eclampsia	Severe Pre-eclampsia	Total Pre-eclampsia
6·1— 8·0	—	—	1	1
8·1—10·0	—	—	2	2
10·1—12·0	—	—	7	7
12·1—14·0	—	—	6	6
14·1—16·0	14	2	16	18
16·1—18·0	16	10	9	19
18·1—20·0	24	28	8	36
20·1—22·0	17	9	1	10
22·1—24·0	9	1	—	1
24·1—26·0	3	—	—	—
Average	19·1	18·3	14·8	16·7
Standard Deviation ...	2·58	1·46	2·90	2·95
Maximum ...	16·0	22·6	21·0	22·6
Minimum	15·1	14·8	7·6	7·6

The average sugar mobilisation was 19·1 mgm. per 100 ml. ±2·58, with a maximum and minimum of 26·0 and 14·3 mgm. respectively. The scatter of values was almost identical both above and below the mean, but in just over two-thirds of the experiments the mobilised sugar exceeded 18 mgm. per 100 ml.

The sugar mobilisation index in normal non-pregnant controls under identical conditions was 30·1±5·2, the range of values obtained being between 22·7 and 40·0. Overlapping of values in these two groups occurred in only 5 instances. Compared with these normal values the sugar mobilisation index in the last trimester of normal pregnancy shows considerable depreciation, and this indicates statistical significance.

2. *Pre-eclampsia*—This condition was found to be associated with a reduced mobilisation of sugar. But, compared with normal pregnancy this reduction was not significant in mild toxæmia, where the average value was 18·3 mgm. per 100 ml. ±1·46. In severe toxæmia, however the sugar mobilisation index was appreciably less than normal, being only 14·8±2·90. The difference in sugar mobilisation between normal pregnancy and severe toxæmia is statistically significant. The frequency distribution of values in normal pregnancy and toxæmia is shown in Table 1. This shows that the distribution is almost similar in normal pregnancy and mild toxæmia. However, in severe pre-eclampsia the scatter shows a remarkable shift to the left, so that 30 per cent of the values are placed below the minimum for normal pregnancy. Thirty-five per cent of normal pregnant women mobilised more than 20 mgm. of glucose under the conditions of the experiment. Similar mobilisation was seen in 20 per cent of mild, and in only 2 per cent of severe pre-eclamptic subjects. Only 10 per cent of the values in severe pre-eclampsia were above the mean observed in normal pregnancy. Corresponding values were obtained in 38 per cent of mild pre-eclampsias, and 40 per cent of cases of normal gestation.

Sugar Mobilisation and Clinical Course of Toxæmia. Experiments in order to determine sugar mobilisation were repeated at weekly intervals with a view to ascertain if any relationship existed between the clinical severity of the toxæmia, and the capacity of the liver to mobilise its glycogen reserve. The results are presented in Fig. 1 and Table 2.

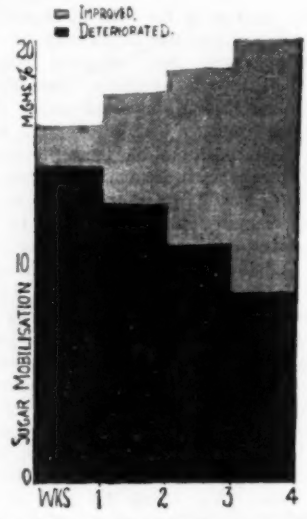

FIG. 1—SUGAR MOBILISATION IN RELATION TO THE CLINICAL COURSE OF PRE-ECLAMPTIC TOXAEMIA OF PREGNANCY

TABLE 2—SUGAR MOBILISATION INDEX IN RELATION TO THE CLINICAL STATE OF TOXAEMIA

Improved				Deteriorated			
Weeks after Admission No.	Average	Stand. Dev.	Min.-Max.	Weeks after Admission No.	Average	Stand. Dev.	Min.-Max.
1	16·2	2·49	11·4—22·6	1	14·4	2·27	7·6—19·1
2	17·7	2·08	12·0—23·0	2	12·6	1·13	7·0—19·0
3	18·9	1·85	15·5—22·0	3	10·8	1·13	6·4—13·6
4	20·1	1·12	17·0—21·4	4	8·6	1·19	6·0—10·5

It will be seen from the data that the sugar mobilisation index increases with the improvement in the clinical condition, and decreases with its deterioration. In patients who were cured the normal pregnancy level was reached between the third and the fourth weeks of study. In those patients where the toxæmia grew worse the initial values were lower than those of the other group. This is probably due to the initial severity of the toxæmia. During the follow-up the sugar mobilisation index declined progressively in these patients. The average values in both groups indicate statistical significance, but a study of the distribution of the values shows that the improvement in the lower values in the first group, and the reduction of the higher values in the second group of cases are the principal reasons for the changes shown by the average figures. This was believed to be caused by overlapping of values obtained during the follow-up. In order to eliminate this, all cases in the second group (deteriorated cases) were subjected to further analysis in relation to the total duration of the toxæmia, irrespective of their time of admission. In ascertaining this, where proper antenatal history was not available reliance was placed on the first appearance of visible œdema. The accuracy of this practice may be open to question, but it must be accepted that of all subjective symptoms this is the most dependable one. The results of this analysis is shown in Fig. 2 and Table 3.

TABLE 3—SUGAR MOBILISATION INDEX IN RELATION TO DURATION OF THE TOXAEMIA

	Duration in Weeks				
	1	2	3	4	5
Average ...	17·4	15·8	13·7	10·9	7·0
Standard Deviation	3·31	3·47	3·19	2·52	1·17
Minimum ...	12·7	8·5	7·5	7·1	6·0
Maximum ...	22·6	20·0	19·7	17·0	8·2

The figures indicate that the capacity of the liver to mobilise glycogen becomes progressively less as the toxæmic state continues to persist in an aggravated form. Compared with the sugar mobilisation index in normal pregnancy each successive week causes a reduction in values which amounts to 6·1, 17·3, 28·2, 41·8, and 63·5 per cent respectively in the present series. The change in the values satisfies statistical significance at each stage. The decrease affects not only the average, but also the range of values. The lower values seems to be affected earlier than the higher values in these cases. It will be seen that the gradient of fall increased considerably when the toxæmia persisted for more than three weeks.

Sugar Mobilisation and Blood Pressure in Toxæmia of Pregnancy. The results of certain hepatic function tests reported earlier (Mukherjee 1951a, 1951b, 1951c) point out that the state of the diastolic pressure may have some effect on the functional efficiency of the liver. It was therefore considered that an analysis of the sugar mobilisation indices in toxæmia in relation to the blood pressure observed at the time of the experiments might prove interesting.

The systolic blood pressure did not seem to have any significant influence on the sugar mobilising capacity of the liver in toxæmia of pregnancy. However, with an increase in the diastolic pressure there was a noticeable decrease in the sugar mobilisation index. This became apparent when the diastolic pressure was more than 100 mm. Hg. Below this level the sugar mobilisation was not grossly different from normal. Persistence of the diastolic pressure above 110 mm. Hg. was found to cause gross deterioration of the sugar mobilisation index. The results are shown in Fig. 3 and Table 4.

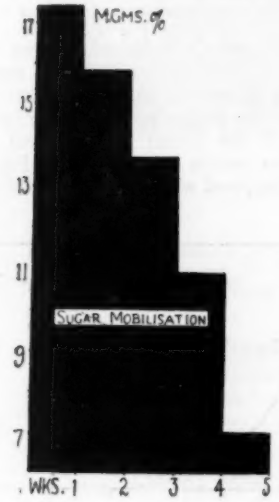

FIG. 2—SUGAR MOBILISATION IN SEVERE PRE-ECLAMPSIA IN RELATION TO THE DURATION OF ILLNESS.

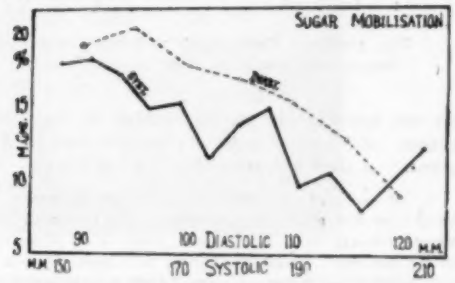

FIG. 3—SUGAR MOBILISATION IN RELATION TO THE BLOOD PRESSURE IN SEVERE PRE-ECLAMPSIA.

TABLE 4—SUGAR MOBILISATION INDEX IN RELATION TO DIASTOLIC BLOOD PRESSURE

B.P. mm. Hg.	Aver.	Stand. Dev.	Depreciation per cent Norm.	Min.-Max.	B.P. mm. Hg.	Aver.	Stand. Dev.	Depreciation per cent Norm.	Min.-Max.
86-90	18·9	2·10	1·05	15·7-21·0	106-110	15·1	1·29	20·9	10·6-16·3
91-95	20·0	2·10	—	15·8-22·6	111-115	12·6	1·03	34·0	7·0-11·3
96-100	17·5	3·19	8·4	14·5-22·0	116-120	8·9	1·09	53·4	6·0-10·6
101-105	16·6	1·90	13·1	13·0-19·2					

3. *Eclampsia*—The average sugar mobilisation in the 28 cases of eclampsia in this series was 5·2±2·6, with a maximum of 15·1, and a minimum of 3·2. This was obtained at the time of admission irrespective of the condition of the patient, and represents a fall of 78·8 per cent below the normal pregnancy level. However, the effect of eclampsia on sugar mobilisation was shown more clearly by 5 cases whom we had the opportunity of following up from the pre-eclamptic state. The glucose mobilisation in these patients 7 to 21 hours before the onset of convulsions was 16·3, 16·0, 11·6, 12·5 and 13·0 per 100 ml. respectively. During the stage of eclampsia the values obtained in these cases were 3·5, 4·8, 9·0, 7·6, and 5·5 mgm. respectively. Thus, the onset of eclampsia was responsible for a decrease in the sugar mobilisation which varied from 39·8 to 78·2 per cent. The patient who had the greatest fall also had the largest number of convulsions. The effect of the number of convulsions on the sugar mobilisation index is shown in Fig. 4. It will be seen

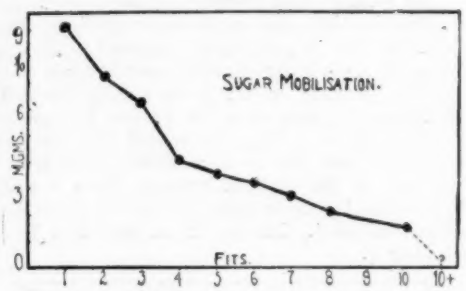

FIG. 4—SUGAR MOBILISATION IN ECLAMPSIA IN RELATION TO THE NUMBER OF CONVULSIONS.

that this becomes less as the number of convulsions increase. An interesting feature was observed in three patients. A short account of this is given below:

1. M. aet. 24, primigravida, gestation 39 weeks, admitted after five eclamptic convulsions. On admission blood pressure 178/144 mm., œdema + +, coma + +, urine, albumin 0·9 per cent. Initial blood sugar 70·7 mgm. per 100 ml. Sugar mobilisation index 3·4 mgm. After 2 more convulsions the blood sugar was 60·3 mgm., and the sugar mobilisation index was '−4·5' mgm. The test was repeated 3 hours before death. By that time the patient was in deep coma and has had 14 convulsions. The blood sugar was 47·3 mgm., and the injection of adrenalin caused a further lowering of blood sugar to 36·8 mgm. per cent. Thus the sugar mobilisation index was reduced to '−10·5'.

2. H. aet. 22, primigravida, full term, admitted after 14 convulsions. On admission, blood pressure 115/100 mm., œdema + + +, coma + + +, urine, albumin 1·7 per cent. Blood sugar on admission 76·0 mgm. per 100 ml. Sugar mobilisation index 0. The patient had 4 more convulsions, at the end of which the test was repeated. The blood sugar level was 69·0 mgm. The sugar mobilisation index was '−17·1'.

3. L. aet 19· primigravida, gestation 38 weeks, admitted after 1 eclamptic fit. On admission, blood pressure 210/186 mm., œdema + +, coma +, urine, albumin 1·3 per cent. At this stage the blood sugar was 81·2 mgm. per 100 ml., and the sugar mobilisation index was 9·9. The patient had 2 more fits, and the coma deepened. On the following day the blood sugar level, and sugar mobilisation were 80·0 mgm. per cent, and 0 respectively. The patient died in a state of coma, and 14 hours before death, the test when repeated showed that the blood sugar was 76·6 mgm. per 100 ml., and the sugar mobilisation index was '−10'.

Follow-up study in eclampsia shows that sugar mobilisation is considerably affected if the convulsive stage persists for any length of time, but in patients, who recover, the process appears to be reversible, for by the end of the second week normal values are restored. The results are shown in Fig. 5, and in Table 5. Compared with the sugar mobilisation index

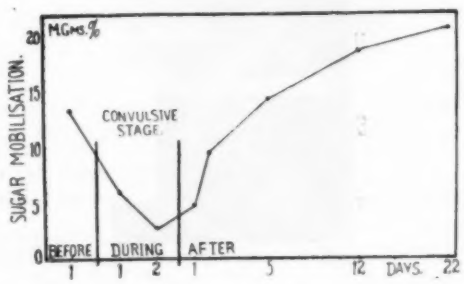

FIG. 5—SUGAR MOBILISATION IN ECLAMPSIA IN THE PRE-CONVULSIVE, CONVULSIVE AND CONVALESCENT STAGES.

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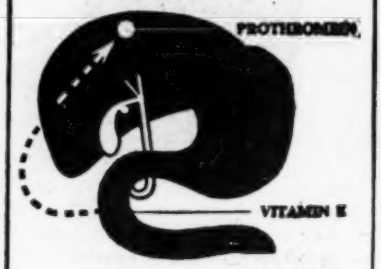

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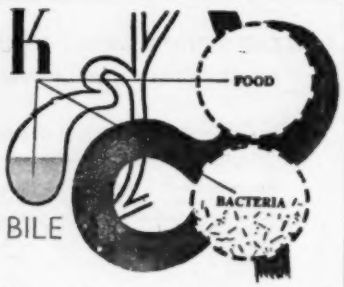

3 *Natural Vitamin K in the gut is derived partly from the food and partly from the intestinal flora which synthesize it. Bile is necessary for its absorption.*

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TABLE 5—SUGAR MOBILISATION INDEX IN THE PRE-CONVULSIVE, CONVULSIVE AND CONVALESCENT STAGES OF ECLAMPSIA

	Pre-convulsive stage 7-21 hrs.	*Convulsive Stage Days*		*Convalescent Stage Days*				
		1	2*	1	2	5	12	22
Average ...	... 13·2	5·9	2·7	4·6	9·4	14·2	18·3	20·2
Standard Deviation	... 1·91	2·69	0·62	1·19	1·79	2·73	1·55	1·64
Minimum ...	... 11·6	3·2	2·1	3·0	6·9	13·8	14·3	19·0
Maximum ...	... 16·0	11·0	3·6	7·3	12·7	16·6	19·7	21·0

* Cases where sugar mobilisation index was negative are excluded.

of the pre-convulsive stage, persistence of convulsions caused this to decrease by 55·2 per cent, on the first day, and 79·5 per cent on the second day in the present series of cases. Considering the margin of experimental error allowed in the estimation of sugar the small values obtained on the second day can hardly be regarded as significantly positive. The improvement in the post-convulsive stage, however, was found to be rapid.

DISCUSSION

The results of the experiments described here suggest that the capacity to mobilise glycogen is less than normal in pregnancy, and still less in pregnancy toxæmia. The degree to which this function suffers depends on the severity of the condition. This is revealed not only by the lower averages in severe pre-eclampsia, but also by the follow-up studies described above.

The small number of normal women studied as controls offer an interesting contrast. The last trimester of gestation was found to be associated with a 38·0 per cent decrease of the sugar mobilisation index. The values obtained in mild toxæmia, although less than those in normal pregnancy, cannot be considered as significantly different. However, in severe pre-eclampsia, and in eclampsia the sugar mobilisation index was reduced by 52 per cent, and 83·2 per cent respectively of the non-pregnant level. Compared with the values obtained in normal pregnancy, the depreciation in severe pre-eclampsia and eclampsia amounted to 22·5 per cent, and 72·8 per cent respectively. Convulsions of eclampsia are undoubtedly responsible for this considerable depletion of the sugar mobilising capacity of the body. However, toxæmia itself plays no less an important part in it, and this is shown by the fact that the sugar mobilisation index in severe pre-eclampsia of long duration (5 weeks, or more in the present series) was not significantly different from that in eclampsia.

The cause of this defective sugar mobilisation in toxæmia of pregnancy is apparently an insufficient glycogen reserve of the liver. The other possibility, *viz.*, an abnormal failure of the glycogenolytic response has been known to be the cause of von Gierke's disease. But between this condition, and toxæmia of pregnancy there is nothing in common from a clinical standpoint, inspite of an apparent similarity of the results of some biochemical tests (hypoglycæmia, ketosis, hyperglycæmia after ingestion of glucose or fructose (Ellis and Payne, 1936), and reduced sugar mobilisation (Lindsay *et al*, 1935). Moreover, the nature of sugar utilisation in toxæmia of pregnancy shows (Mukherjee, 1952) that, the physiology of the two conditions is entirely different.

The inadequacy of the mobilising capacity of the liver in toxæmia of pregnancy is further demonstrated by a negative sugar mobilisation which was observed in some cases of eclampsia. Such a condition is possible only when the hepatic glycogen store is exhausted, and the Cori cycle involving the lactic acid derived from the muscles as a result of adrenalin injection is grossly interfered with. Deficient glycogen reserve in toxæmia of pregnancy has been a subject of considerable speculation in the ætiology and management of this condition. In a comparatively recent review, Bokelmann (1936) stated that "the liver in the pregnant woman, and more so in toxæmia is poor in glycogen, and so, there is need of carbohydrates in the body." It will be evident from this and the previously reported experiments (Mukherjee, *loc. cit.*) that mere supplying additional carbohydrate (glucose) does not help the liver in building up its glycogen reserve. The cause of the deficient glycogen storage appears to be connected not with reduced carbohydrate consumption, but with faulty metabolism of sugars, which is manifested by an abnormal utilisation, storage, and mobilisation of glucose. Indirect evidence also, in support of this is available from the studies on lactic acid in the blood (Zweifel, 1923; Kienlin, 1926; Loesser, 1926; Stander, 1926), and tissue fluid (Mukherjee and Govan, 1950).

It is difficult to explain the processes involved in this abnormal metabolism. The relation between the blood pressure and the sugar mobilisation index shows that a rising diastolic tension lessens the mobilisation of sugar. This is presumably due to a depletion of the hepatic glycogen reserve. Normally the mobilisation of this glycogen under the influence of adrenalin, or sympathetic stimulation occurs as a result of an alteration of the hepatic circulation brought about by vaso-constriction, which causes a degree of asphyxia, and a consequent change in the pH of the liver cells. Uncompensated high diastolic pressure would have a similar effect on the liver cells with regard to sugar mobilisation.

The disturbed metabolism of carbohydrates in toxæmia of pregnancy is associated with a state of acidosis, lipæmia and a disordered protein metabolism. This increases the importance of a careful investigation of the functional status of the pituitary body. Pitressin causes a loss of glycogen from the liver (Lambie, 1926), and an increase of lactic acid in the blood (Bischoff and Long, 1931). Anterior pituitary extracts are known to interfere with the utilisation of carbohydrates in the peripheral tissues (Russel, 1938, 1942), and ketonæmia (Houssey and Biasotti, 1931). It may be re-called that some observers (Hofbauer, 1918; Anselmino *et al*, 1932; Mukherjee, 1941) have recorded evidences of hyperfunction of the pituitary body in toxæmia of pregnancy. This has also been demonstrated by more recent investigations (Govan, Mukherjee, Hewitt and Harper, 1951). It is thus, possible that the disordered carbohydrate metabolism in toxæmia of pregnancy is related to the status of the functional activity of the pituitary body.

Summary and Conclusion

The results of a series of experiments undertaken in order to study the nature of sugar mobilisation in toxæmia of pregnancy are described.

It was observed that that this became impaired in severe pre-eclampsia, and eclampsia. When toxæmia was of a mild degree the results were not significantly different from those in normal pregnancy. However, in the latter condition the mobilisation of sugar in the body was less than that in normal non-pregnant persons.

The diminished sugar mobilisation does not appear to be due to a deficient consumption of carbohydrates. It is probably related to the state of vascular spasm, and the functional status of the pituitary body.

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A STUDY ON THE CIRCULATING BLOOD VOLUME UNDER ANAESTHESIA*

2. RESULT OF REPEATED BLOOD VOLUME DETERMINATIONS AT VARYING INTERVALS OF TIME

PURNIMA CHATTERJEE, M.B., B.S.,
Calcutta

The usefulness of dye-method (T-1824) in the determination of plasma volume has been established for a fairly long time. But this method has given varied results in the hands of different workers, when used for repeated determinations at short intervals. In view of the controversies that exist over the validity of dye-method in repeated determinations of plasma volume, it appears worthwhile to report the results obtained in human subjects, in course of a study in the circulatory blood volume under anæsthesia.

It is presumed that the plasma volume of normal adults while at rest does not change appreciably over a period of two hours. This is also corroborated, though roughly, by determination of total protein by Van Slyke's (1947) copper sulphate method. So theoretically the two consecutive determinations by identical method within the period of two hours should yield values for plasma volume that are not significantly different from each other. Also the results of plasma volume estimations from the different veins of the body should be approximately the same.

Material and Method

The subjects were indoor patients admitted for minor operations. They were normal adults without any cardiovascular disease. They were kept under basal conditions.

A detail description of the method has been given in a previous communication (Chatterjee, 1952). A control sample of blood was withdrawn from one of the

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anti-cubital veins, then an accurately measured 2·5 c.c. of 7 per cent Evans blue was injected into the same vein. A relatively smaller amount of 2·5 c.c. of dye instead of the standard amount of 5 c.c. was used to prevent the colouring of the conjuctiva and skin of the subjects. Another sample of blood was removed after ten minutes from a different vein. The second determination of blood volume was made using a different set of veins, either in the upper or the lower extremity (the long saphenous vein in front of the medial malleolus) after intervals of time varying from ten to hundred and fifteen minutes. A control sample of blood was drawn before the second dye injection. The dyed samples of the two series were read directly against the respective controls in a photo-electric colorimeter (Leitz) using 610 mμ filter. Precautions were taken to avoid hæmolysis and vascular stasis during withdrawal of blood. A single ten minute sample was used so that two determinations could be made within a very short interval, and the same technique was followed on both occasions. Plasma volume was calculated according to the method of Gregersen (1944).

In another series of experiments the determination of plasma volume was repeated by the same method after a varying interval of one to thirty-five days.

Results

The results are summarised in Tables 1 and 2. In the first series, twenty-one individuals were subjected to repeated determinations of blood volume at a vary-

Table 1

No.	Subject No.	Weight in kg.	Hæmoglobin	Cell vol. %	Total protein	Plasma volume	Difference	Diff./kg.	Total cell mass	Difference	Diff./kg.	Interval in min.	Situation of veins: A-Arm L-Leg	L-Left R-Right
1.	18	50	9·6	34		2109	+ 12	+0·56	1086	− 98	− 9·02		A	L-R
			9·6	31·8		2121			988			60		R-L
2.	19	48·1	7·0	26	6·5	2636	+102	+3·86	926	− 13	− 1·4			R-L
			7·0	25	6·5	2746			913			30		L-R
3.	20	46·3	13	40	7·2	2413	− 93	−3·85	1608	− 62	− 3·18			L-R
			13	40	7·2	2320			1546			50		R-L
4.	27	51·8	8·5	24·5		1887	− 99	−5·24	612	− 47	− 7·6			R-L
			8·5	24		1796			565			60		L-R
5.	28	53·1	9·4	20·5		2295	+ 88	+3·83	591	+ 4	+ 0·6			L-R
			9·4	20		2383			595			60		R-L
6.	29	46·7	12	40·1	7·1	2335	+ 50	+2·14	1563	+569	+36·4			R-L
			14	47·2	7·1	2385			2132			60		L-R
7.	31	64·5	13·5	36·7	6·2	2794	− 93	−3·32	1619	− 33	− 2·0			R-L
			13·5	37	6·2	2701			1586			30		L-R
8.	32	40·9	15·5	43	7·2	2490	− 17	−0·702	1825	− 13	− 0·7			L-R
			14·5	43	7·2	2403			1812			30		R-L
9.	33	47·2	11·5	35	7·5	2771	−167	−6·02	1492	−151	−10·1			L-R
			11·5	34	7·5	2604			1341			30		R-L
10.	34	38·1	11·5	39	7·2	2306	+ 97	+4·20	1474	+ 62	+ 4·2			L-R
			11·5	39	7·2	2403			1536			30		R-L
11.	37	42·7	14·5	45·4	7·2	2760	−160	−5·79	2294	− 62	− 2·70			L-R
			14·5	46·2	7·2	2600			2232			30		R-L
12.	38	40·4	13	42·2	6·8	2729	− 22	−0·79	2028	+227	+11·19			L-R
			13	45	6·8	2757			2255			30		R-L
13.	39	43·6	13·5	37·2	7·2	2266	+147	+6·48	1342	+463	+34·50			L-R
			13·5	42·8	7·2	2413			1805			30		R-L
14.	187	38·1	8·5	29·8		2187	+ 47	+2·5	928	− 30	−3·34			L-R
			8·5	28·7		2232			898			10		R-L
15.	42	42·7	8	29	6·2	2632	+154	+5·85	1075	+ 13	+ 1·20		A	L-R
			9	28·1	6·2	2786			1088			40	L	R-L
16.	44	37·7	14·5	35·5	7·2	2245	− 23	−1·02	1230	+ 86	+ 0·44		A	L-R
			14	37·2	7·2	2222			1316			45	L	R-L
17.	45	67·2	14	40·1	7·2	2674	+ 92	+3·44	1790	+221	+12·34		A	L-R
			14	42·1	7·2	2766			2011			35	L	R-L
18.	51	41·3	15	39	6·7	2254	−100	−4·43	1441	+313	+21·72		A	L-R
			15	42·7	6·7	2354			1754			115	L	R-L
19.	53	67·2	12·25	37·4	7·2	2628	− 32	−1·21	1708	−138	− 8·07		A	L-R
			12·25	37·7	7·2	2596			1570			60	L	R-L
20.	54	48·1	12	34·5	6·8	2962	−102	−3·44	1560	+ 7	+ 0·44		L	R-L
			12	35·4	6·8	2860			1567			30	A	L-R
21.	62	38·6	10	27·4		2500	+ 53	+2·12	943	− 32	− 3·39		L	R-L
			10	26·3		2553			911			75	A	L-R

ing interval of 10 to 115 minutes, average 45 minutes. In the second series of six cases the blood volume was determined at an interval of 1 to 35 days. The absolute values for plasma volume and the total cell mass along with the differences of two determinations are given in the tables.

The statistical analysis of the first and second sets of values of the first series was made, (*vide* Table 2). This series was analysed by means of statistical test of significance to study the effect of time factor, by grouping the whole set of figures into two, one upto fifty minutes and the other beyond fifty minutes intervals. It is evident that the group means of differences of these two determinations of plasma volume and total cell mass do not differ significantly within ten to hundred and fifteen minutes.

TABLE 2—TEST OF SIGNIFICANCE OF MEAN OF THE GROUPS AND THE ENTIRE SERIES

	Time in min		*Mean*	*Difference in mean*	*S.E*	*Se*	*Df*	*t*	*5 per cent t*	*Remark*
Plasma volume	Group I Subject Nos. 2, 3, 7-17, 20	0-50	+0·068	+0·386	233·876	4·01	19	0·208	2·903	Not significant
	Group II Subject Nos. 1, 4, 6, 18, 19, 21	50-115	−0·318		71·86					
Total cell mass	Group I	0-50	+3·33	+1·04	1519·99	13·375	19	0·168	2·093	Not significant.
	Group II	50-115	+4·37		1879·03					
Total Subject Nos. 1-21	Plasma volume	0-115	−0·0609		3·814		20	0·073	2·086	Not significant.
	Total cell mass		+3·675		13·048		20	1·29	2·086	Not significant.

TABLE 3

No.	*Subject No.*	*Weight in kg.*	*Haemoglobin*	*Cell vol.%*	*Total protein*	*Plasma volume*	*Difference*	*Diff./kg.*	*Total cell mass*	*Difference*	*Diff./kg.*	*Interval in min.*	*Situation of veins* *A-Arm L-Leg Control*	*L-Left R-Right reading*
1.	37	42·7	14·5	45·8		2680	+145	+5·41	2264	+171	+ 4·00		A	A
	56	46·8	15	46·4		2825			2435			27	L	L
2.	38A	40·4	13	43·5		2768	+ 18	+0·65	2131	−203	− 9·52		A	A
	38B	41·2	13	40·9		2786			1928			16	A	A
3.	45	67·2	14	41·1		2720	−108	−3·77	2002	−367	−18·33		A	L
	53	67·2	12·25	38·5		2612			1635			9	A	L
4.	7	45·5	13	42		2359	+ 7	+0·296	1708	−131	− 7·66		A	A
	20	46·3	13	40		2366			1577			22	A	A
5.	42	42·7	8·5	28·5		2709	+183	+6·75	1079	−159	− 3·72		A	L
	62	38·6	10·0	26·8		2526			920			35	A	A
6.	88	50	14	36·5		3257	−107	−3·34	1872	− 94	− 5·02		A	A
	88	50	12	36·1		3148			1778			1	A	A

The second series is given in Table 3. The whole series was split up into two groups according to the length of interval of successive determinations, *viz.*, one upto twenty days, and the other over twenty days. Each group is again subdivided according to the change of body weight; one with no change and loss and the other with gain in body weight. The total change in plasma and cell volume with number of experimental subjects in each group have been shown in Table 4. Table 5 sets out the results of the analysis of variance of the Table 4 showing that the time factor probably does not significantly influence the plasma and cell volume, although a definite conclusion cannot be made as the number of observation is small.

Observations obtained by using the different sets of veins of the body are given in Table 1. In the first group (subject numbers 1 to 14) only the veins of

TABLE 4—GROUP ANALYSIS OF TABLE 3 FOR PLASMA AND CELL VOLUME

	Difference in weight	*No. of Subject*	*Below 20 days*	*No. of Subject*	*Above 20 days*	*Total No.*	*Total*
	0 or <0	2	−217	1	−183	3	−400
Plasma volume	>0	1	+ 18	2	+152	3	+170
	Total	3	−199	3	− 31	6	−230
	0 or <0	2	−461	1	−159	3	−620
Total cell mass	>0	1	−203	2	− 40	3	−163
	Total	3	−664	3	−119	6	−783

TABLE 5—ANALYSIS OF VARIANCES OF THE TABLE 3 FOR PLASMA AND TOTAL CELL MASS

	Source of variation	*Degree of freedom*	*Sum of Sqs.*	*Mean of Sq.*	*Observed F*	*5 per cent F*	*Remark*
	Time	1	90·7424	90·7424	<1	18·71	Not significant.
	Weight (Wt.)	1	49536·7424	49536·7424	10·404	,,	,, ,,
Plasma volume	Interaction Time × Wt.	1	5852·0910	5852·0910	1·229	,,	,, ,,
	Error	2	9522·5000	4761·2500			
	Time	1	28910·0844	28910·0844	<1	18·51	Not significant.
	Weight (Wt.)	1	14214·0844	14214·0844	<1	,,	,, ,,
Total cell mass	Interaction Time × Wt.	1	7650·75	7650·75	<1	,,	,, ,,
	Error	2	82866·50	41433·25			

the upper extremities were used for two sets of determinations. In the second group (subject numbers 15 to 21) the veins of upper as well as those of lower extremities have been used. The result of the test of significance in Table 6 shows that there was no significant difference between these two groups.

TABLE 6—ANALYSIS OF VARIANCES OF THE TWO GROUPS

		Mean	*Difference in mean*	*S.s*	*Se*	*Df*	*T*	5%*t*	*Remark*
	Group I Arm & Arm Subject No. 1-14	−0·185	+0·372	221·55	4·0112				
Plasma volume						19	0·201	2·093	Not significant.
	Group II Arm & Leg Subject No. 14-21	+0·187		84·273					
	Group I	+3·289	+1·159	2787·50	13·371				
Total cell mass						19	0·188	2·093	Not significant.
	Group II	+4·448		611·36					

DISCUSSION

Cruickshank and Whitfield (1945) reported that after an initial intravascular injection of Evans blue in cats there is a period of rapid loss of dye from blood. They suggested that unless some means such as previous saturating does of Evans blue, presumably to 'block' the reticulo-endothelial system, are employed there is a possibility of the value of plasma volume being too high. From this it follows that if the determinations of plasma volume are repeated within short intervals of time, the values obtained for plasma volume by the first injection would be significantly higher than that with subsequent determinations. This concept is termed 'cat effect.' Mather *et al* (1947) reported the occasional occurence of "cat effect" in man. Meneely *et al* (1947) recently stated that the validity of blue dye method for estimation of plasma volume is open to question.

Bonnycastle (1947) studied the effect of repeated determination of plasma volume in six dogs. He found no evidence of erroneously high values of plasma volume in the first determination as a result of immediate absorption of the dye by the reticulo-endothelial system. He is of the opinion that no pre-injection of dye is required. Gibson and Evans (1937) also repeated three plasma volume determinations on two subjects at twenty-seven minutes intervals. In the first subject the second and third estimates were less than the first by 5 and 3 per cent respectively. In the second subject the second estimate was greater than first by 1 per cent. Crooke and Morris (1942) found that in two normal cases where three plasma volume estimations were made at eighty minutes intervals, the second and third estimates were both greater than the first by 1 per cent in one subject, and the second estimate was greater than the first by 6 per cent in the other. Reeve and Armin (1946) have reported the results of repeated determination of plasma volume in six human volunteers by injection of Evans blue. The values they obtained by the first and second injections do not differ by more than the error of the method; the mean difference was +2·42 per cent, the interval between the two injections varied from sixty to ninety minutes. Campbell *et al* (1948) have not observed "cat effect" in consecutive experiments on six human subjects. "In their hands Evans blue in the basal human for determination of plasma volume suggests reliability as shown by the close agreement of the optical densities of the samples withdrawn." The average disagreement in the values of plasma volume was +0·60 per cent.

This report presents the results obtained when repeated determinations of plasma volume and total cell mass were made, at intervals varying from 10 to 115 minutes in 21 men and 1 to 35 days in 6 individuals. In carrying out these determinations no attempt was made to "block" the reticulo-endothelial system by a saturating dose of Evans blue prior to the initial determination. There was no evidence of abnormally rapid elimination of the dye. In the series shown here no significant difference was found between the two estimations of plasma volume and total cell mass. This is contrary to the theory of Cruickshank and Whitfield (*loc. cit.*). These observations, all made on men, indicate that absorbing machanism postulated by them does not affect the constancy of repeated plasma volume estimations made with Evans blue at short intervals.

The statistical analysis of the values of plasma volume and total cell mass obtained by using the veins of upper and lower extremities reveal no significant difference; it follows that the veins of both the extremities may be used with equal advantage for the determination of blood volume.

Summary

1. Repeated plasma volume determinations by Evans blue were made at intervals varying from 10 to 115 minutes on 21 subjects and at intervals of 1 to 35 days on 6 individuals. The statistical analysis of the values show no significant difference between the two determinations either in the plasma volume or total cell mass in anyone of the groups.

2. There was no evidence of erroneously high value in the first determination as a result of immediate absorption of the dye by the reticulo-endothelial system *viz.*, the so-called "cat effect."

3. There was no significant difference of the values of plasma volume estimated from the different veins of upper and lower extremities.

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ACTION OF PREPARATIONS OF PHOSPHOTUNGSTIC AND PHOSPHOMOLYBDIC ACIDS ON CANCER

H. N. MUKHERJEE, B.SC., M.B., D.I.C.,
Professor of Biochemistry, R. G. Kar Medical College, Calcutta

On account of the hypoglycæmic and oxidising actions of phosphotungstic and phosphomolybdic acids and their property of reacting with many substances of biological importance the writer was led to investigate the action of phosphotungstic and phosphomolybdic acids and their preparations on cancer (Mukherjee, 1936). In the present paper preparations with hydrogen peroxide will be considered.

50 per cent solutions (w/v) of (1) phosphotungstic acid (Merck & Co. Inc.) in 'Peroxyl' (May & Baker Ltd.) and of (2) phosphomolybdic acid (Merck & Co. Inc.) in 'Peroxyl' were separately tried on cancer. Both these preparations in 1·0 c.c. dose after prolonged daily administration appeared to have slight action against cancer. It was then thought that by mixing these two preparations in proper proportions complex preparations of more powerful action might be obtained (Mukherjee, 1949 and 1950).

By mixing the phosphotungstic acid preparation (50 per cent solution of phosphotungstic acid in 'Peroxyl') with the phosphomolybdic acid preparation (50 per cent solution of phosphomolybdic acid in 'Peroxyl') in nine different proportions, nine mixed preparations were obtained. These preparations were called 9:1, 8:2, 7:3, 6:4, 5:5, 4:6, 3:7, 2:8 and 1:9 complex preparations respectively. The 9:1 complex preparation was made by mixing nine volumes of the phosphotungstic acid preparation with one volume of the phosphomolybdic acid preparation. The 8:2 complex preparation was made by mixing eight volumes of the phosphotungstic acid preparation with two volumes of the phosphomolybdic acid preparation and so on.

The preparations tend to degrade on keeping. There is constant evolution of oxygen in both the phosphotungstic acid and the phosphomolybdic acid preparations and for this reason the mouths of glass flasks or cylinders containing these preparations are kept just covered with watch glasses. Moreover, insoluble matter is continuously separating out from the phosphomolybdic acid preparation. The complex preparations also are similarly stored. The 9:1, 8:2 and 7:3 complex preparations do not show much precipitation of insoluble products on standing but the other complex preparations from 6:4 to 1:9 progressively show more and more precipitate formation as the phosphomolybdic acid content of the preparation increases. The flasks containing the preparations are kept in glass cases exposed to diffused light. The

midday room temperature varied from about 20°C in winter to about 36°C in summer.

These preparations are degraded by boiling and by alkalies but as these preparations are acid and protein precipitants they had to be suitably buffered before being administered intramuscularly or intravenously. They were also administered intravenously simply diluted with glucose solution but with this method of administration the veins became thickened and severe febrile reactions were encountered. The preparations in 1·0 c.c. amounts were administered daily to adult cancer patients with average body weight of about 50 Kg.

The complex preparations give colour reactions with benzidine, uric acid, phenols, tyrosine, bile acids and many other substances. If a freshly made phosphomolybdic acid preparation is used in making the complex preparations the colour reactions given are very poor but if an old phosphomolybdic acid preparation (about a fortnight old) is utilised for this purpose the colour reactions are well marked. In the present work complex preparations made with fresh phosphomolybdic acid preparations have not been used.

On account of stability and from a few preliminary trials the writer was inclined to prefer the 9:1, 8:2 and 7:3 complex preparations for the purpose of this investigation. The 8:2 complex preparation was considered representative of this group and was tried in several patients with cancer. 1·0 c.c. of this preparation was administered intravenously daily with 25 c.c. of 25 per cent glucose solution to each patient. There was considerable relief of pain after a few days and the growths also slightly regressed after about a fortnight (Mukherjee, 1950). It was then decided to try the 9:1 complex preparation in cancer and it was also thought desirable to study the colour reactions more thoroughly to differentiate the preparations from one another.

Colour Reactions

As mentioned above the complex preparations give colour reactions with many substances of biological importance. Colour reactions with benzidine, uric acid, phenol, tyrosine, and sodium taurocholate were studied with the following solutions:

(1) One-fourth saturated solution of benzidine in alcohol—prepared by diluting one volume of a saturated solution with 3 volumes of alcohol.

(2) 0·1 per cent solution of uric acid—prepared in the usual way by treating 0·1 gm. of uric acid in a beaker with a hot solution of lithium carbonate (0·05 gm. in 20 c.c. of water) and then the total volume is made upto 100 c.c. with further addition of water.

(3) 0·5 per cent solution of carbolic acid—prepared by diluting 0·5 c.c. of liquefied carbolic acid upto 100 c.c. with water.

(4) 0·1 per cent solution of tyrosine—prepared by treating 0·1 gm. of tyrosine with 15 c.c. of 5 per cent sodium bicarbonate solution in a flask and dissolving by immersing in a boiling water bath with further addition of water. After cooling the solution is made up to 100 c.c. with water.

(5) 1·0 per cent solution (w/v) of sodium taurocholate in water.

(6) 5 per cent solution (w/v) of sodium bicarbonate in water.

To explain the colour reactions a typical experiment is described. The 9 complex preparations were made in 10 c.c. amounts from a 4 hours old phosphotungstic acid preparation and a 14 days old phosphomolybdic acid preparation in 9 test tubes properly marked. The phosphomolybdic acid preparation was filtered before use but the phosphotungstic acid preparation was not filtered as it contains negligible amounts of insoluble matter which do not affect the preparation. The preparations were then allowed to stand overnight. Next day the colour reactions were studied. The complex preparations were filtered before use.

The colour reactions were studied in test tubes as follows:—

Benzidine—0·5 c.c. of the preparation + 1·5 c.c. of sodium bicarbonate solution + 5 c.c. of water. Mix and add 0·1 c.c. of the benzidine solution. An intense blue colour is immediately formed. The 9:1 preparation gives the weakest colour reaction but the 1:9, 2:8 and the phosphomolybdic acid preparation itself give the strongest reactions.

Uric Acid—0·5 c.c. of the preparation + 1·5 c.c. of sodium bicarbonate solution + 5·0 c.c. of water. Mix and add one c.c. of the uric acid solution. A deep green colour is produced immediately. The 9:1 preparation gives the weakest colour reaction but the strongest colour reactions are given by the 1:9 and 2:8 complex preparations.

Phenol—0·5 c.c. of the preparation + 1·5 c.c. of sodium bicarbonate solution + 5·0 c.c. of water. Mix and add one c.c. of the phenol solution. A green colour quickly appears with the 9:1 preparation. A darkish green colour appears with the 8:2 preparation. The other preparations do not react well. The reading of the colour reaction is taken within 15 minutes (10 minutes in hot weather) as after some time other preparations also begin to show darkish green colours which deepen on standing.

Tyrosine—0·5 c.c. of the preparation + 1·5 c.c. of 5 per cent sodium bicarbonate solution + 5·0 c.c. of water. Mix and add one c.c. of tyrosine solution. A green colour quickly appears with the 9:1 preparation and a darkish green colour with 8:2 preparation. The reading of the colour is taken within 15 minutes (10

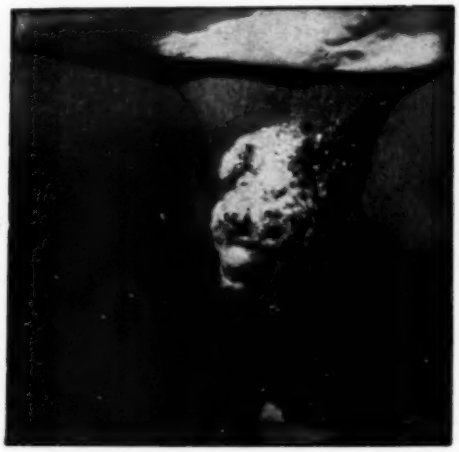

FIG. 1

FIG. 2

FIG. 3

FIG. 4

FIG 5

FIG 6

FIG. 7—Microphotograph (E & H × 87) showing cellnest formation and squamous cells invading the general tissue.

minutes in summer) as after some time other preparations also show darkish green colours which deepen on standing.

Sodium Taurocholate—0·5 c.c. of the preparation + 1·5 c.c. of 5·0 per cent sodium bicarbonate solution. Mix and add 1·0 c.c. of the sodium taurocholate solution. A green colour slowly appears with the 9:1 preparation on keeping overnight (in winter an incubator at 38°C is used). The 9:1 complex preparation gives the best reaction and the 8:2 the next best. The other preparations do not give good reactions. As this colour reaction develops slowly and the colour produced is not very deep this colour reaction is found to be of help in standardising the 9:1 complex preparations. The colour produced is comparatively stable and does not become darkish even after 2 or 3 months. It was found from experiments that the best colour reactions are given by 9:1 complex preparations made with old phosphomolybdic acid preparations (2 to 4 weeks old) and a common one day old phosphotungstic acid preparation. Again with a common 20 days old phosphomolybdic acid preparation and 5 different phosphotungstic acid preparations (4 hours old, 8 hours old, 1 day old, 2 day old and 7 days old) 5 different 9:1 complex preparations were prepared. The 9:1 complex preparations made from 4 hours old, 8 hours old and one day old preparations of phosphotungstic acid gave very similar colour reactions which in intensity of colour were far superior to the colours given by the 9:1 preparations made from 2 days old and 7 days old phosphotungstic acid preparations.

From the above observations it was decided to prepare the 9:1 complex preparations with an one day old phosphotungstic acid preparation and a 3 weeks old (about) phosphomolybdic acid preparation for trial on cancer.

It was also found that the colour reaction given by a 9:1 complex preparation with sodium taurocholate progressively decreases in intensity as the age of the preparation increases. For this reason it is thought not advisable to use a 9:1 preparation which is more than a month old.

Again with an one day old phosphotungstic acid preparation and a 20 days old phosphomolybdic acid preparation four complex preparations (9·25:0·75, 9:1, 8·75:1·25, 8·5:1·5) were prepared by mixing (1) 9·25 c.c. of phosphotungstic acid preparation with 0·75 c.c. of phosphomolybdic acid preparation (2) 9·0 c.c. of phosphotungstic acid preparation with 1·0 c.c. of phosphomolybdic acid preparation, (3) 8·75 c.c. of phosphotungstic acid preparation with 1·25 c.c. of phosphomolybdic acid preparation and (4) 8·5 c.c. of phosphotungstic acid preparation with 1·5 c.c. of phosphomolybdic acid preparation.

Of these four preparations the 9:1 and 8·75:1·25 complex preparations give the best colour reactions with sodium taurocholate (the colour given by the 8·75:1·25 is slightly deeper than that given by the 9:1 complex preparation). It is possible that a 8·75:1·25 complex preparation may be slightly better than the 9:1 complex preparation.

Clinical Trial

Trial of the 9:1 complex preparation on cancer—The writer now has been able to try the 9:1 complex preparation (prepared by directly mixing 9 volumes of the phosphotungstic acid preparation with 1 volume of the phosphomolybdic acid preparation) on several cancer patients and this preparation appears to have a definite action against cancer (Mukherjee, 1951). Three patients with carcinoma penis were treated with the 9:1 complex preparation. The growths regressed in all these cases. A 9:1 complex preparation prepared from an 1 day old phosphotungstic acid preparation and a 20 days old phosphomolybdic acid preparation was tried in Case 1 and Case 2. In Case 3, a 9:1 complex preparation made from an 1 day old phosphotungstic acid preparation and a 28 days old phosphomolybdic acid preparation was used. The 9:1 complex preparations were filtered before use.

Method of administration—About 25 c.c. of normal saline (0·9 per cent solution of sodium chloride) is first drawn into an all-glass syringe. Then 1 c.c. of the 9:1 complex preparation is drawn and lastly 1·5 c.c. of 5 per cent solution of sodium bicarbonate is drawn into the syringe. The contents of the syringe are then gently mixed. Bubbles of CO_2 evolve. After waiting for 2 or 3 minutes the solution is administered intravenously.

The 9:1 complex preparation in 1 c.c. dose was given daily (Sundays excepted) to the patients. The first patient (Case 1) tolerated the injections well with occasional febrile reactions but the second patient (Case 2) had febrile reactions almost daily. The third patient (Case 3) also had frequent febrile reactions but he tolerated the injections well.

Case Reports

Case 1—A. N. G. male, 45, admitted in hospital on 8-1-51. A cauliflower-like ulcerated growth involving almost the whole of the body of the penis. Duration—about one year. General condition of the patient—fair.

Biopsy report: Epidermoid carcinoma, grade 2.

Treatment with the 9:1 complex preparation started on 20-1-51 and was continued upto 24-2-51.

First photograph (Fig. 1, *vide* Plate) was taken on 20-1-51, second photograph (Fig. 2, *vide* Plate) taken on 27-2-51. From the second photograph (Fig. 2) it can be seen that part of the cauliflower-like growth has disappeared and the mass of the growth appears to have diminished.

Case 2—R.L.D. male, 50, was admitted on 4-1-51 with a hard fusiform growth involving the distal part of the penis. A large part of the prepuce has sloughed off and there are a few globular growths on the ulcerated glans penis. There is bilateral inguinal lymphatic metastasis. Duration—about 6 months. Condition of the patient was very low with inanition and anorexia.

Biopsy report: Epidermoid carcinoma, grade 2.

Treatment with the 9:1 complex preparation was started on 22-1-51 and was continued upto 19-2-51.

First photograph (Fig. 3, *vide* Plate) was taken on 22-1-51, second photograph (Fig. 4, *vide* Plate) was taken on 27-2-51.

This patient became progressively weaker and in spite of supportive treatment ultimately became comatose and expired on 2-3-51.

The second photograph of case 2 (Fig. 4) shows that the metastatic inguinal glands on both sides are considerably reduced in size. The globular growths on the glans penis have disappeared and the ulcerated preputial surface and also the glans penis show signs of healing and are reduced in size.

Case 3—B.B.G. male, 45, was admitted on 30-8-51 with. A growth on the right inferolateral side of the corona glandis. The growth is nodular with an early breakage of the surface—margins irregular. Size—about 2·0 cm. × 1·0 cm. × 0·5 cm.

Duration—about 8 months. General condition of the patient—weak, emaciated.

Biopsy report: Epidermoid carcinoma—Grade 2. A microphotograph of a section of the growth shows cellnest formation and squamous cells invading the general tissu (Fig. 7, *vide* Plate).

Treatment with the 9:1 complex preparation started on 5-9-51 and was continued upto 6-10-51.

First photograph (Fig. 5, *vide* Plate) was taken on 3-9-51. Second photograph (Fig. 6, *vide* Plate) was taken on 6-10-51. The second photograph of Case 3 (Fig. 6) shows that the ulcer has disappeared and that there is a small scab visible in the photograph as a small raised circumscribed lighter area.

Discussion

It would appear from the photographs given above that the 9:1 complex preparation has a well-marked action against cancer. During the course of treatment of about one month with the 9:1 complex preparation the growths in all the three patients showed progressive retrogression.

It appears to the writer that with a better understanding of the effect of heat and light on the preparation it can be further improved. The patients usually have slight rise of temperature (about 0·5°F.) after an injection but occasionally the temperature shoots up to 100°F or even to 101°F. The temperature usually rises within an hour following an injection coming down to normal after about another hour. The injections may cause some anorexia. If 25 per cent glucose solution is used in the injections instead of normal saline, anorexia does not develop. As mentioned above 1·0 c.c. of the preparation buffered with 1·5 c.c. 5 per cent sodium bicarbonate solution and diluted with 25 c.c. of normal saline was administered to the patients. The pH of the resultant solution is about 3·5 as found by indicator papers. If 1·0 c.c. of the preparation is buffered with 2·0 c.c. of 5 per cent sodium bicarbonate solution and then diluted as usual with normal saline, the pH of the solution is about 6. It appears that such a solution has a reduced pyrogenic effect.

Summary

1. A preparation of phosphotungstic and phosphomolybdic acids is described which appears to have a well-marked action against cancer.

2. This preparation was tried in three patients with carcinoma penis for nearly a month. In all these patients the growths showed continuous retrogression during this period.

Acknowledgment

The writer is grateful to the authorities of the surgical unit of the R. G. Kar Medical College Hospital for giving him facilities to carry out this work in the surgical wards.

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PRACTITIONERS' CORNER

PASTEUR TREATMENT: SOME PRACTICAL QUESTIONS AND THEIR ANSWERS

T. P. BANERJI, CAPT. P.M.S. (I), M.B.B.S. (LKO.), L.S.M.F.,

Medical Officer, District Hospital, Fatehgarh, U.P.

With the introduction of Semple's carbolised emulsion in preference to the original Pasteur vaccine in India it has now become possible to administer antirabic treatment at every hospital in India as this emulsion keeps well for six months.

In Uttar Pradesh we have one such centre in each district headquarter hospital, besides in some Mission and Railway Hospitals. To my mind much of the vaccine is being wasted due to this easy availability and lack of clear understanding by the average medical

officer about its correct indications. The greatest waste occurs in its free use in the cases of bite by domesticated and pet animals other than dogs.

Having run one of these centres at the divisional headquarters hospital at Bareilly for over a year and having watched the work at other centres closely, it is my opinion that nearly twenty-five per cent of cases could have been spared the treatment with more intelligent co-operation of the patients and better discretion by the medical officers. The questions that came before me from time to time are listed below with their answers and references, which may prove useful to the practitioners who have to deal such cases in their hospital practice. A few interesting cases which came across are also reported along with it.

Common Questions and Answers

Q. Will all the cases bitten by frankly rabid animals develop hydrophobia and die?

Ans. No. Kern (1944) states that only 16 per cent of cases bitten by proven rabid dogs develop rabies in the absence of any preventive measures, but 100 per cent of those who develop rabies, die.

Q.—Does a case who was bitten by a proved rabid animal but has escaped hydrophobia for a long period *i.e.*, a year or so, need Pasteur treatment?

Ans.—Yes. Cases are known to have developed hydrophobia years after the original bite. One of my own relations died a year after an incomplete Pasteur treatment.

Q. Why do the quack remedies thrive right in front of the antirabic treatment centres?

Ans. This is answered in question one. One in six develops rabies hence the quack thrives on the score of cure of five in each six plus cures on non-infected animal bites in addition. The most painful quack remedy is the application of a paste of red chillies over a well-scarified wound. It seemed to me to be very strange to find the patients bearing it up so well, though they make a great fuss at the time of injection treatment.

Q. What is the order of danger in the common biting animals?

Ans. The danger decreases in the following order as given by Babes (1912) in Pasteur Institutes of Europe.

Site of bite	*Animal*	*Chance of infection*
Deep eye, nose, lip wounds ...	Wolf	100%
,, ,, ,, ,, ,,	Cat	70%
,, ,, ,, ,, ,,	Dog	60%
Rest of face	Dog	50%
Rest of bare area	Dog	30%

Q. Is pregnancy a bar to Pasteur treatment?

Ans. No, it has no ill-effect on pregnancy at any stage.

Q. A person having completed a Pasteur course of injections is again bitten by a rabid animal. Has he any immunity?

Ans. Yes, there is a negligible immunity in such a person for about a year, but in case of fresh bite by a proved rabid dog he must be given full Pasteur treatment over again. In animal the immunity drops by 20 per cent every yer (Tidy), but no information regarding immunity in the human being is available.

Q. Dog-owners approach the antirabic centres for getting their pets protected in the interest of their children at home; is the Kasauli vaccine effective, if so, in what doses?

Ans. Yes, the dogs can be immunised prophylactically by the usual Pasteur vaccines (Ravnel). A five dose course in the first year, followed by three dose course annually is really safe, but the usual one-dose method practised by the veterinary assistants produces a false sense of security and is useless (Mukherji).

Q. What is the average incubation period in man?

Ans. Incubation period directly varies with the distance of the wound from the periphery to the nearest point of the central nervous system and with the depth of the wound. The length of the nerve trunks from the face to the brain is much smaller than the length of nerve fibre that the virus has to travel in the case of bite in the legs and therefore the incubation period of face-bites is counted in days while that of leg is reckoned in weeks or months.

Q. Is the biting animal infective during the whole incubation period?

Ans. No, Ghosh (1945) puts the incubation period in the animal as ten to ninety days, and recommends segregation of the animal, which is to be observed for three months. This, however, is not practicable. Zagarro (quoted by Rosenau) observed earliest virus in the dog's saliva 12 days before the dog showed obvious signs of rabies. Thus, anyone bitten 14 days before the onset of rabies in the dog is safe. Here I must point out a dangerous common belief amongst the doctors which must be eradicated. Most commonly the advice given to a patient is to tie up the dog and the patient is asked to report for treatment only if the dog dies *within ten days*. First, it must be made clear to the patient that captive dog must be given food and water and that the period of observation must not be less than 14 days and that death of the animal is not the sole criterion. Early signs of hydrophobia may only develop by the 12th day and the animal may survive another week or so.

Q. Can powerful chemical or physical cauterization alone do away with the necessity of Pasteur treatment or *vice versa*?

Ans. No. Both the procedures are essential. There is not enough time in the case of face and neck

wounds for the vaccine treatment to be effective due to short incubation period and thus much as we might dislike to disfigure the patient we must cauterize face and neck wounds with powerful and extensive methods. Paul quoted by Kern (*loc. cit.*) advocates *fuming nitric acid* to be applied drop by drop by a capillary pipette to bring it in contact with every part of the wound including the deepest layers. War Office Memoranda on Medical Diseases in Tropics, 1942, advise to heat metal knitting needles to dull red and then apply in such a way that reaches the corners and depths of the wounds. Romans knew the use.

Q. How long after the bite, the cauterization is effective?

Ans. The best is immediate but it is worthwhile to attempt cauterization upto twenty-four hours after and even longer (Rosenau).

Q. Can the virus pass through the unbroken skin?

Ans. Usually not. But in cases of infants and babies where an infected dog has licked the face or neck, treatment is indicated.

Q. Are we justified to give Pasteur treatment in the case of monkey bite?

Ans. Usually not. I have been approached for Pasteur treatment for horse, camel, sheep and pig bite usually by their keepers. Except in one set of cases where a horse ran amuck and bit more than a dozen cases within an hour at Bareilly in 1949, I think I was justified in not advising the Pasteur treatment in most of them. Human rabies is 90 per cent due to canine and 10 per cent due to feline origin.

Q. Is there any season for dog bite in relation to the incidence of rabies?

Ans. No.

Q. What are the complications following vaccine treatment?

Ans. 1. Marked local reaction and considerable tenderness are common but not of much importance.

2. Headache is fairly common.

3. Slight to moderate temperature without local sepsis is often seen.

4. Relapse of B. T. malaria is seen during treatment.

5. Neuroparalytic sequelæ. Ghosh (1946) says that these are very rare and seldom fatal, whereas the War Office Memoranda, mentioned above, suggest that neuroparalytic sequelæ are not altogether rare and sometimes are fatal." These appear within thirty days of commencement of the vaccine treatment and after seven days of the end of the treatment Case No. 2 (described below) developed symptoms on the fifth day, which is unusually early. They take the form of encephalomyelitis ranging from local paresis, paræsthesia, minor neuritis to severe ascending peripheral neuritis, severe myelitis with paralysis which may prove fatal. Landry's type of ascending paraplegia is also seen. McCoy (quoted by Kern) puts the incidence of nervous involvement due to Pasteur treatment as 0·016 per cent *i.e.*, six cases in the total of 37,500 cases in America. I had the occasion to see three cases in three years at three different places. Of course, no definite percentage can be said to have been established as the cases were widely separated, yet to my mind it appears that the incidence is definitely higher in U.P. than that of 0·016 per cent. The reporting to the Kasauli Institute is also defective as when such cases occur they abscond from the centre as will be seen in my Case 2 or go away to some other institution as in Case 3.

Case 1 occurred in the year 1950 at the Fatehgarh District Hospital Centre where 274 cases were treated during the year. Case 2 is one out of about 500 of the District Hospital Bareilly in 1949 and Case 3 was the one demonstrated to me in the Medical College Hospital wards by Professor B. B. Bhatia, M.D., M.R.C.P., of Lucknow, in 1948.

Case Reports

Case 1—Jagan, 35 years, Hindu male, sweeper, bitten by dog on 20-12-50. The dog died of frank rabies 8 days after bite. On the day of bite the patient was treated by chemical cauterization of three superficial scratches on the skin over the front of the left knee and was asked to observe the animal and report. Three days after the death of the animal he reported on 31-12-50 for treatment.

On the tenth day of vaccine treatment he developed some fever. He was injected on that day as well as on the eleventh day, after this he absconded from the centre. He developed on the eleventh day, difficulty in micturition, sudden extreme weakness in all the four limbs, but could still walk about. Following day he noted tingling and numbness in the left foot and leg and observed that the tips of his left toes lagged behind during walking. Later he felt both his legs stiff, more in the left. Thereafter he was unable to stand on his legs, but could flex and extend the limbs at all joints, slowly though with difficulty.

He was admitted in to the hospital on 16-1-51. Further antirabic treatment was refused by him.

On Examination—General condition was good. Temp.—98·4°F, pulse—80 p.m., tongue—clean; eyes, nose, throat, heart, lungs and abdomen—normal.

Nervous system—Reflexes and sensations:

		Right	*Left*
Lower limbs		Normal, equal	Normal, equal
Upper limbs	Knee jerks	+	+ + +
	Ankle jerks	+	+ +
	Ankle clonus	absent	+ + + and sustained
	Plantar response	flexor	absent
	Sensations	normal	normal

Marked spasticity was noted in both the legs, more on the left.

C. S. F.—of normal tension and microscopically normal. W. R. negative.

There was no further spread of the condition. He was treated with hexamine i.v., thiamine chloride injections and sedatives. The symptoms cleared up very rapidly and he was discharged cured. He is still under observation, but refused completion of Pasteur treatment, which in this case was essential as the dog was rabid.

Case 2—Middle-aged muslim woman bitten by a pet dog. Began Pasteur treatment at Bareilly District Hospital in 1949. After 5th injection sudden extensive numbness and tingling appeared in all four limbs. On sixth day she presented in the outdoor department with hysterical symptoms resembling hydrophobia, like feigning to bite the attendants etc. She refused admission and further antirabic treatment. A week later I was called to treat her, when she had developed complete flaccid paralysis of all the four limbs, all cutaneous reflexes were absent. She had sphincter difficulty in commencement of the act of micturition. Two days later she developed persistent hiccough, and severe headache. In another two days the condition began to improve. Legs gradually became spastic with return of reflexes with progressive exaggeration as time went on. Sustained ankle clonus and extensor plantar response appeared. Wassermann test and C. S. F. examinations were not done. At the end of about 10 weeks the patient was normal. The dog was not infected hence Pasteur treatment was not given. She was treated with hexamine 10 per cent intravenously twice a day for 10 days, thiamine chloride 100 mg. i.m. daily for 3 weeks, phenobarbitone 1 gr. t. i. d. for 2 weeks.

Case 3—A middle aged male who developed sudden and complete paraplegia with peripheral neuritis during an antirabic course given at I. D. H. Lucknow, with difficulty in micturition. It was demonstrated to us by Professor B. B. Bhatia of Lucknow in the Medical College Hospital in 1948.

Summary and Conclusions

1. Practical questions that arose during working of antirabic centre enumerated and answers compiled.

2. Three cases of neuroparalytic involvement due to Pasteur treatment are recorded.

Acknowledgment

The writer acknowledges his sincere thanks to Dr. Kartar Singh, M.B.B.S., P.M.S., Superintendent of District Hospital Fatehgarh and Civil Surgeon Farrukhabad District for encouragement and permission to use hospital records.

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SPECIAL ARTICLES

STUDIES IN CHOLERA

K. KRISHNAMURTHI RAO, M.B.B.S., D.P.H.,
C. CHELUVARAYAN, L.M.P.,
AND
C. V. NATARAJAN, M.B.B.S., DR.P.H.,
F.R.I.C. F.A.SC.,

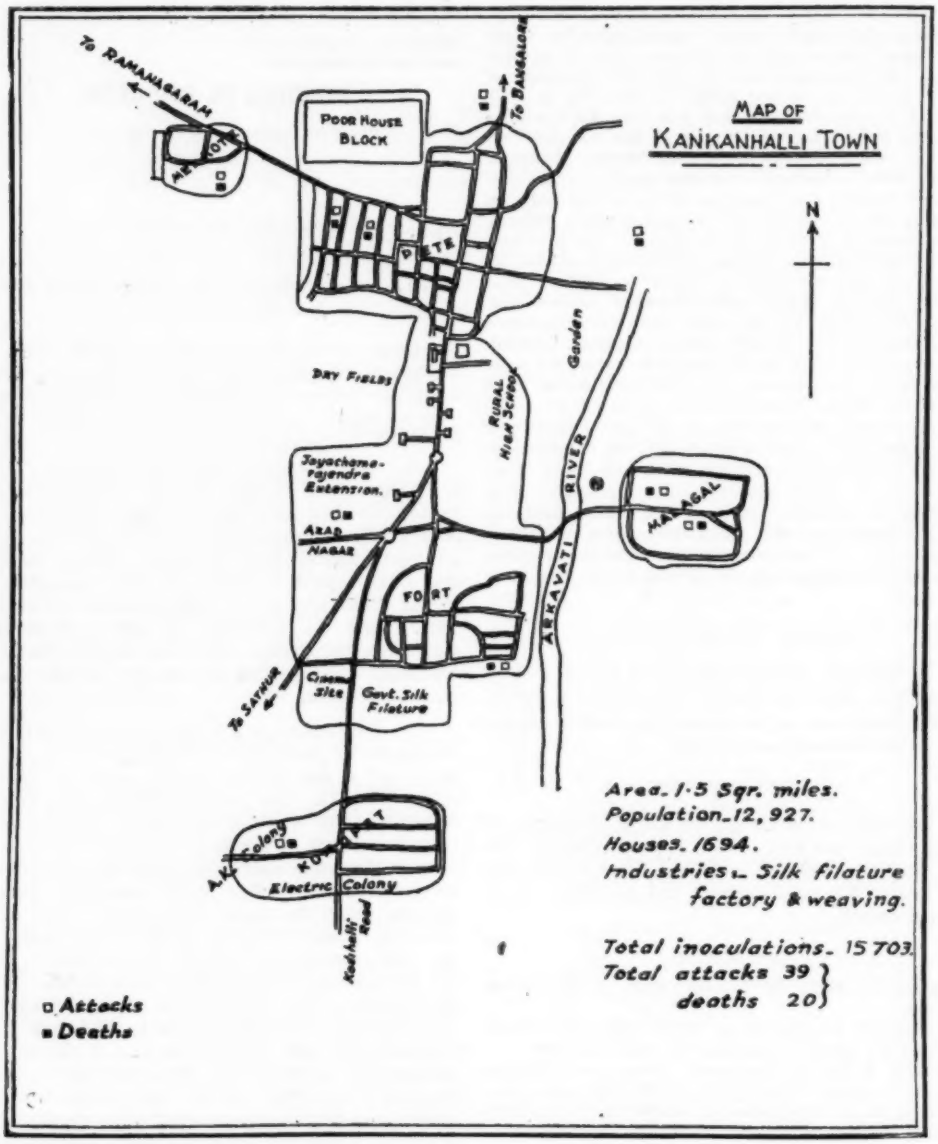
(*From the Laboratories of the Public Health Institute Mysore State*)

From about the end of the year 1949 and throughout the year 1950, cholera became prevalent in various towns and villages of the Mysore State in spite of vigorous preventive measures undertaken by the Public Health Department.

An epidemiological study was undertaken in the two towns *viz.*, Koratagere in Tumur District and Kankanhalli in Bangalore District, where an epidemic of cholera broke out and continued for a period of about 4-6 weeks and subsided; a second epidemic started a few weeks later in both these places. Bangalore also had an epidemic of cholera from about the end of June, 1950. Since the epidemics in these 3 places varied noticeably, an attempt was made to understand the conditions which caused the changes of behaviour of cholera incidence.

1. *Kankanhalli* is a town about 1·5 square miles in area with a population of about 13,000; the old town has added a silk filature factory, and an electrical colony (Map 1). The town stands on the bank of Arkavathi river which flows towards the East of the town from North to South. From about November 2, 1949 to about the middle of April 1950, a total of 39 attacks of cholera with 20 deaths occurred. The map annexed shows the places in the town where attacks occurred. From about the middle of December, when the 19th case occurred till the end of January, when the 20th case occurred in the series, there was a lull in the epidemic. The second series of 20 cases were due to a recrudescence of the epidemic. The cause of this recrudescence may perhaps be due to (about 10,000 vaccinations had been done from November to end of December 1949) the fact that some people were using the river as a source of domestic water supply. Other important preventive measures apart from preventive vaccinations, such as chlorination of water sources, D.D.T. spraying, propaganda, hospitalisation of suspected cases, etc., had brought about the subsidence of the initial attack.

During the second series, about 5,700 inoculations were again given to some people who had been protected during the first epidemic period also. It is stated on good authority that 3 attacks of cholera occurred among inoculated persons; these people died within 3 days of the inoculation. Bacteriologically, out of 15 motions and one vomit, sent for examination, 8 were found positive for the *V. cholerae;* these bacteria gave all the reactions of the *V. cholerae* and agglutinated in high dilution with the *Inaba* (Kasauli serum) *vide* Table 1.



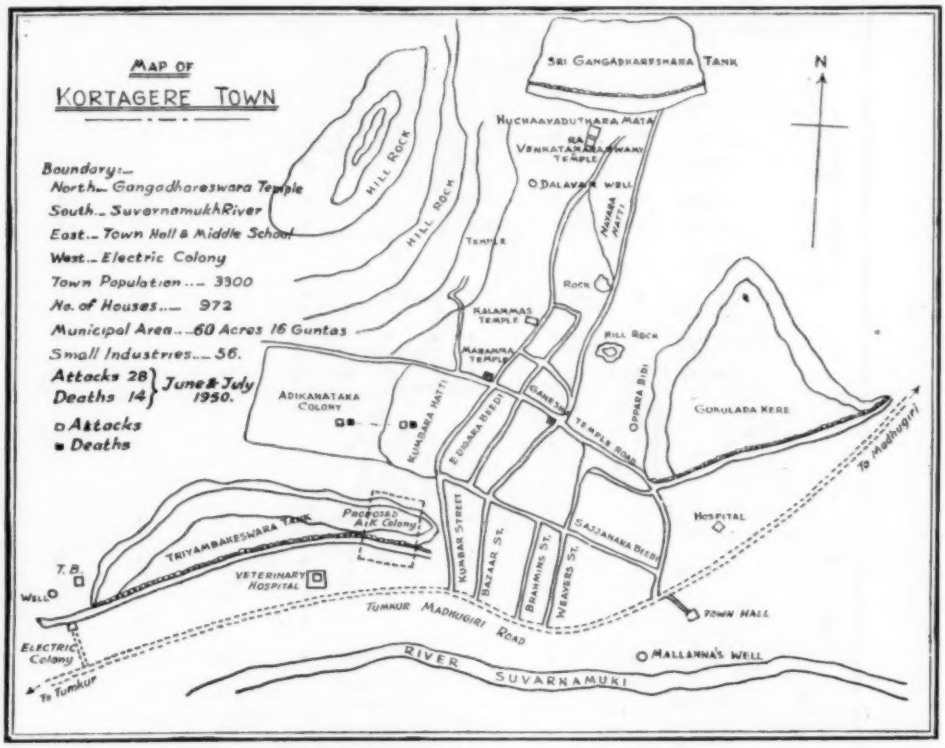
MAP 1

2. In *Koratagere*, the pattern was similar in that the epidemic continued from May, 1950 to end of July, 1950, with a lull in June with recrudescence of the

TABLE I

Sl No.	Date	Sent by	Nature of sample	Name	Miscroscopic examination: Motility	Miscroscopic examination: Morphology	Culture in A. Peptone: Morphology	Culture in A. Peptone: Motility	Culture in A. Peptone: Morphology	Culture in A. Peptone: Motility	Cholera red and Pellicle formation	Culture on Aronson 1 MacConkey 2 Plates	Suspicious Colonies Biochemical reaction: Motility	Morphology	Glucose	Lactose	Sucrose	Maltose	Mannite	Mannose	Arabinose	Cholera red	"O" Subgroup	Inaba	Ogawa	Greig's Tests	Cholera Vibrios isolated on culture
1.	5-11-49	Health Inspector Asst. Surgeon, Kankanhalli	Vomit	Venkatesh	+	+	+	+	+	+	+	Suspicious colonies on 1 & 2	+	+	+	–	+	+	+	+	–	+	1:40	1:80	Neg.	—	
2.	15-11-49		Stool	Girijamma	+	+	+	+	+	+	–	,,	+	+	+	–	+	+	+	+	–	+	1:40	1:160	Neg.	—	,,
3.	17-11-49		,,	Lingamma	+	+	+	+	+	[+]	+	,,	+	+	+	–	+	+	+	+	–	+	1:40	1:160	Neg.	—	,,
4.	30-11-49		,,	Jayadeva	–	–	+	–	+	+	+	,,	+	+	+	–	+	+	+	+	–	+	1:40 Rough	1:160 agglutination	Neg.	—	,,
5.	,,		,,	Basava	–	–	+	–	+	[+]	[+]	,,	+	+	[+]	–	+	+	+	[+]	–	+	1:40	1:80	Neg.	—	,,
6.	2-2-50		,,	Hanumamma	+	[+]	+	[+]	+	[+]	[+]	,,	[+]	+	[+]	–	+	+	+	[+]	–	+	1:320	1:160	Neg.	—	,,
7.	3-2-50		,,	Mutta	–	–	+	[+]	+	[+]	[+]	,,	+	+	[+]	–	+	[+]	[+]	[+]	–	+	1:80	1:80		—	,,
8.	3-4-50	A.S. Kankanhalli	,,	Venkatamma	–	–	+	[+]	+	[+]	[+]	,,	[+]	+	[+]	–	+	[+]	[+]	[+]	–	+	1:320	1:320	Neg.	Neg.	,,

attacks in July. A total of 28 attacks with 14 deaths occurred. *Koratagere* is a small municipal town, in Tumkur District, with a population of 3,300 (Map 2). It stands on the bank of Suvarnamukhi river and skirts the side of a hill. The hill top, temple, Adikarnataka colony etc., are all to the west of the river on the Tumkur-Madhugiri road; the houses stand tier upon tier on the hill. The attacks were mostly among the Adikarnataka community, and in part of the Gollarahatti, as may be seen from the map. From the beginning of the epidemic vigorous measures were adopted to prevent the spread of cholera. Every one was inoculated with anti-cholera vaccine. People were not permitted to use the river water. The water in the various wells were chlorinated, and D.D.T. was sprayed. When the initial attacks died down, the people began to use the river water again. When this water was used for drinking purposes, there was a recrudescence of attacks of cholera. A small puddle in the middle of the river which was tested for the



MAP 2

presence of cholera vibrios, was positive, and a culture of *V. cholerae* was obtained. Here also, there were 2 deaths among the inoculated cases. Three motions had been sent (from the 17th to 19th July 1950), by the Health Inspectors (sent for duty to the town), all the three were positive for *V. cholerae* and agglutinated against the Inaba strain (high-titre serum of Kasauli).

Bacteriological Technique

The bacteriological technique adopted in this Institute was as follows. The excreta as sent (whether sent in peptone water, or as a straight motion, vomit, or swab smear on cotton) were (*i*) mounted in physiological saline solution, and examined for morphology and motility. (*ii*) At the same time, tubes containing peptone water—5 ml.—(pH 8·2 to 8·4; composition 1 per cent peptone, 0·5 per cent saline) were inoculated heavily and incubated at 37°C. (*iii*) Serial transfers were made in about every 2 hours, each peptone tube culture being examined again for motility and morphology (*i*. hanging drop, *ii*. simple and *iii*. Gram stain). In this way, even if non-motile bacteria are observed, during the primary, first or second passage, the cultures become positive for motility and morphology as the environmental conditions improve, and the more acid-producing bacteria are inhibited (Veeraraghavan, 1938). Perhaps, in some cases, there may also be changes in

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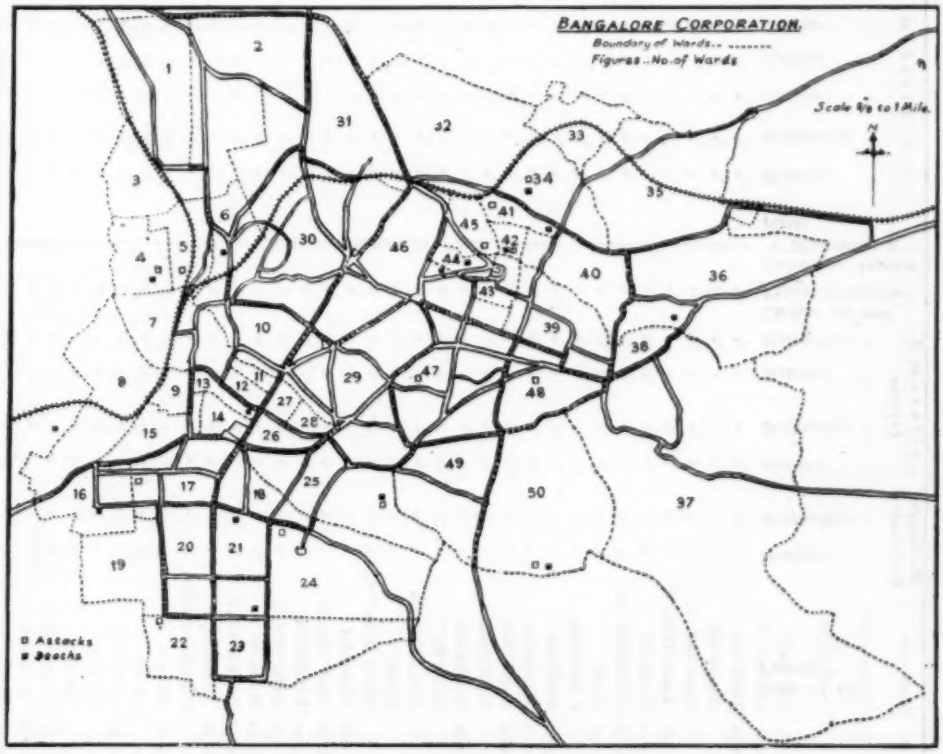
the characteristics of *V. choleræ* due to the person having had preventive anti-cholera inoculation and subsequently becoming infected with a heavy dose of *V. cholerae* by drinking infected water. It would be otherwise difficult to explain the number of successful isolations where, at first, the excretory material sent from the field was negative for the usual methods of identification of *V. choleræ* (*iv*). The bacteria after such passaging (which show *V. choleræ* as possible isolable) are plated on MacConkey (pH 7·8) and Aranson's agar media (pH 8·2) and incubated overnight. (*v*) Colonies are picked out next day (18 hours' incubation), inoculated in peptone water (*vide* Table 2) for 4 hours. (*vi*) Fermentation reactions on sugars (glucose, lactose, sucrose, maltose, mannite, mannose, arabinose) are performed. (*vii*). The cholera red reaction. (*viii*) Agglutination reaction against Kasauli high titre sera, (Inaba, Ogawa and 'O' sera) are also done. (*ix*) Greig's test—hæmolysis of goat's or sheep's R.B.C.—is carried out on each isolated strain. After all these tests are performed on the isolated vibrios from excretory material sent from the field, and only when all these tests have become positive, a culture is considered positive, and a report is sent to the field worker. A preliminary report is sent to him if there are positive signs of motility or morphology after the 3rd or 4th passage etc., *i.e.*, within 24 to 36 hours of receipt of the sample; the final report is sent, within a week, after complete bacteriological investigations, as stated above, have been carried out.

3. *Bangalore Corporation* (the City and the Civil Station) presents a more baffling epidemiological problem. Bangalore started having cholera cases from the end of June. In the beginning, these cases were thought to be due to gastro-enteritis. On the 20th June a specimen of stool sent from the Isolation Hospital of the City, proved positive for cholera. From that day onwards quite a few cases occurred in Bangalore. This study has been made till the end of November, 1950. A total of 102 attacks with 51 deaths have occurred during this period. From 63 of these cases, *V cholerae* strains (all of which were agglutinable by "O"; 50 in high dilutions against " Inaba," and 13 in high dilution against " Ogawa " (Kasauli Serum) were isolated (*vide* Table 2).

From a map of the Corporation of Bangalore, (Map 3) it may be seen that 28 of the City's



MAP 3

TABLE 2

Serial No.	Date	Name of the Patient	Microscopic Examination		Culture in A. Peptone					Biochemical Reaction											Agglutination with high titre serum				Remarks
			Motility	Morphology	Motility	Morphology	Motility	Morphology	Cholera red and Pellicle formation	Culture on Aronson 1 MecConkey 2 plates	Motility	Morphology	Glucose	Lactose	Sucrose	Maltose	Mannite	Mannose	Arabinose	Cholera red	"O" Subgroup	Inaba	Ogawa	Greig's Test	
1.	20- 6-50	Deva Bai	–	–	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1:160	Neg.	Neg.	Cholera vibrios isolated
2.	,,	Amma Bai	–	–	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1:160	Neg.	Neg.	,,
3.	,,	Papa Bai	–	–	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1:160	—	—	,,
4.	3- 7-50	Amtul Hadi	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	1: 80	—	—	,,
5.	8- 7-50	Elizabeth	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	1: 80	—	—	,,
6.	11- 7-50	Kariunnisa Bee	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	—	,,
7.	12- 7-50	Gowri	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:320	1: 80	—	—	,,
8.	,,	Chinnamma	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:320	1:160	—	—	,,
9.	13- 7-50	Parithum	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:320	1: 80	—	—	,,
10.	24- 7-50	Jayapatler	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	—	,,
11.	15- 8-50	Azuth Bee	–	–	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:320	1: 80	—	—	,,
12.	,,	Rukkamma	±	±	±	±	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	—	,,
13.	17- 7-50	Muniswami	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	—	,,
14.	,,	Noor Bi	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	Neg.	1: 40	Neg.	,,
15.	,,	Ammakkamma	–	–	–	–	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 40	—	—	,,
16.	,,	Rama	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:320	1:160	—	—	,,
17.	,,	Bhaki Alias	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1:160	—	—	,,
18.	20- 7-50	Nagamma	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	—	,,
19.	21- 7-50	Syed Abdulla	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1:160	—	—	,,
20.	22- 7-50	Lakshamma	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	—	,,
21.	25- 7-50	Akbar Sheriff	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	Neg.	1: 80	—	,,
22.	31- 7-50	No name	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	1: 80	—	—	,,
23.	1- 8-50	Carlton Davis	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	—	,,
24.	5- 8-50	Achamma	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:320	1:320	—	—	,,
25.	,,	Narayanamurthi	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	—	,,
26.	7- 8-50	Kamala	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:320	1:160	—	—	,,
27.	,,	Ameer	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:320	1:160	—	—	,,
28.	8- 8-50	Annamary	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:320	1:320	—	Neg.	,,
29.	,,	Pavana	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1:320	—	—	,,
30.	,,	Iyyanna	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:320	1:320	—	—	,,
31.	12- 8-50	Munniswamy	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1:160	—	Net done	,,
32.	14- 8-50	Madamma	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1:160	—	Not done	,,
33.	16- 8-50	Ramu	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	do.	,,

Suspicious colonies on 1 and 2

TABLE 2—*Contd.*

Serial No.	Date	Name of the Patient	Microscopic Examination: Motility	Microscopic Examination: Morphology	Culture in A. Peptone: Motility	Culture in A. Peptone: Morphology	Culture in A. Peptone: Motility	Culture in A. Peptone: Morphology	Cholera red and Pellicle formation	Culture on Aronson's MacConkey 2 plates	Biochemical Reaction: Motility	Morphology	Glucose	Lactose	Sucrose	Maltose	Mannite	Mannose	Arabinose	Cholera red	Agglutination with high titre serum: "O" Subgroup	Inaba	Ogawa	Greig's Test	Remarks
34.	17- 8-50	Lakshmi	+	+	+	+	+	+	+	Suspicious colonies on 1 and 2	+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	Not done	Cholera vibrios isolated
35.	28- 8-50	Gijamari	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—		,,
36.	19- 8-50	Lakshmamma	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—		,,
37.	21- 8-50	Kasinath	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—		,,
38.	21- 8-50	Muniamma	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	1: 80	—	Neg.	,,
39.	,,	Chinnamma	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	1: 80	—	,,	,,
40.	24- 8-50	Yellamma	–	–	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	1: 80	—	,,	,,
41.	25- 8-50	Madhurayi	–	–	+	–	+	–	+		+	+	+	–	+	+	+	+	–	+	1: 80	1: 80	—	,,	,,
42.	,,	Mustappa Khan	–	–	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	,,	,,
43.	,,	Kenchamma	–	–	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	1: 80	—	,,	,,
44.	28- 8-50	Muniamma	–	–	+	–	+	–	+		+	+	+	–	+	+	+	+	–	+	1: 80	1: 80	—	,,	,,
45.	30- 8-50	Chinnamma	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	1:160	—	,,	,,
46.	1- 9-50	Muniamma	–	–	+	–	+	–	+		+	+	+	–	+	+	+	+	–	+	1:160	1:160	—	,,	,,
47.	1- 9-50	Veeramma	–	–	+	–	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	1:160	—	,,	,,
48.	2- 9-50	Munipoovan	–	–	–	+	+	+	+		+	+	+	–	+	+	+	+	–	+	+	1:160	—	,,	,,
49.	4- 9-50	Peripilly	–	–	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	1: 80	—	,,	,,
50.	29- 9-50	Imam	–	–	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	—	1:160	,,	,,
51.	3-10-50	Unnamalai	–	–	+	–	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 40	—	1: 40	,,	,,
52.	,,	Amija	–	–	–	–	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	—	1:160	,,	,,
53.	5-10-50	Subbarayan	–	–	–	–	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	—	1: 80	,,	,,
54.	,,	Kamakshi	–	–	+	–	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 40	—	1:160	,,	,,
55.	,,	Chinnasamachar	–	–	–	–	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	—	1: 80	,,	,,
56.	10-10-50	Obiligadu	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	—	1: 80	,,	,,
57.	,,	Parnamma	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 40	—	1:160	,,	,,
58.	17-10-50	Eraiah	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	—	1:160	,,	,,
59.	18-10-50	Venkatamma	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80	—	1: 80	,,	,,
60.	24-10-50	Narayana	–	–	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80 +	—	1: 80 +	,,	,,
61.	,,	Govindappa	–	–	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80 +	—	1: 80 +	,,	,,
62.	26-10-50	Chinnaswami	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1: 80 +	—	1: 80 +	,,	
63.	30-10-50	Muthanna	+	+	+	+	+	+	+		+	+	+	–	+	+	+	+	–	+	1:160	—	1: 80	,,	,,

wards have been free of cholera whereas 22 wards have had attacks many of them with single cases only. The wards which were worst affected were Wards No. 4, 5, 34, 41, 42, 43 and 44. A new labour colony just outside the Corporation limits, Ramachandrapuram by name, was also badly affected. (These cases have not been included in this study. Wards 4 and 5 are adjacent to Ramachandrapuram). The greatest number of attacks occurred during August 1950. (The curve of incidence of cases per week, has been omitted).

Many curious features were noticed in this epidemic in Bangalore. Quite a few of the cholera cases seemed to occur among persons who could not have come in contact with any cases of cholera occurring elsewhere.

One Mrs. A. H., Naraina Pillay Street, Civil Station, could not have had any contact with cholera cases. The house had a flush system and the milk used was boiled. The water supply was from the general Bangalore water supply. She had an attack of cholera which was bacteriologically proved.

Cases also occurred, in unrelated areas (*i.e.*, in houses which were separated by a few miles), one after another, on consecutive days. In some houses, after the occurrence of a case or two of cholera, there was a lull for 2 or 3 days, when again cases diagnosed clinically and bacteriologically as cholera occurred in the same house by possible contacts of cases (*i.e.*, carrier state for short periods). This phenomenon was noticed in the badly sewered areas of wards No. 41, 42, 43 and 44.

Of the sixty-three bacteriologically positive cases which have been tabulated (Table 2) and from which cholera vibrio strains were isolated; all agglutinated against "O" (Kasauli high titre serum), 47 agglutinated against "Inaba" (Kasauli serum) and 16 agglutinated against "Ogawa" (Kasauli serum). It is also to be noticed that from the end of September all the strains isolated were agglutinated in high dilution by "Ogawa" anti-serum only, whereas all the previous strains isolated, were of the "Inaba" type. As has already been stated, quite a few of excretory materials were negative to start with, to become positive later.

SUMMARY

1. A study of three epidemics in two small municipal towns and a corporation have been made. Each study has its distinctive features. In the two towns, the epidemic was mainly water-borne; in Bangalore, however, it could not have been water-borne.

2. A carrier state in cholera is usually discredited. It is difficult to explain the occurrence of unrelated cases in Bangalore or to find sufficient reasons for the persistence of the epidemic.

3. Prophylactic inoculations should always be reinforced with all other preventive measures to combat cholera epidemics.

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GROWTH OF ORTHOPAEDIC SERVICE OF THE WORLD

With Special Reference to the Orthopaedic Hospital of the Society for Rehabilitation of Crippled Children, Bombay

M. G. KINI, M.C., M.B., M.CH. (ORTH.), F.R.C.S. (EDIN.), F.A.C.S., F.I.C.S., F.R.S. (EDIN.), F.N.I., F.A.S.C.,

Director, Children's Orthopædic Hospital, S.R.C.C., Bombay

The development of cripple hospitals and specialist centres of rehabilitation all over the world will show how from small beginnings big things evolved. A peep into the history of the past shows the evolution, development and progress of specialist cripple hospitals in other countries where this speciality became known as orthopædics. This term orthopædia is derived from two Greek roots *orthos* (straight) *padios* (child) and this word was coined by Nicholas Andrea in 1741 which means straightening of children. In his own words he has stated "that he proposed to teach the different methods of preventive and correcting the deformities of children." In the late middle ages, the deformed and the maimed were lodged in homes safeguarded by the church. In India, the crippled sought the sanctuary in places of pilgrimage and each lived on alms given generously by the pilgrims who visited these centres. There was no attempt at institutional care. The crippled and the disabled constituted, therefore, a very important sub-section of beggars in our

country. In western countries, the homes for the crippled or disabled were managed by members of a religious order and were usually attached to a convent or monastery. Due to the kind care and also to some amount of medical attention provided by the church, inmates obtained relief in some cases and cure also in a few others.

It may be said that orthopaedic hospitals began to grow towards the end of the 18th century, and their further development was noticed in the nineteenth century. These institutions did not come into existence due to the efforts of the medical profession alone. The renaissance period and the intellectual development following, had its repercussions on the industrial revolution and the voices of Voltaire, Rousseau and others stimulated humanitarian principles. They formed the background of the growth of this type of specialist hospitals. The larger general hospitals of the time were not equipped properly to care for these cases. The prolonged period of time that was necessary to look after them could not also be given. The year 1780 is notable because this year, Jean Andre Venel constructed a small hospital in Canton de Vaud in Switzerland which was designed exclusively for the care of orthopaedic cases. It was the first beginning of a specialist hospital where all types of apparatus were designed for the use of the cripples in its own workshop. In 1812, Johann George von Heine starter a similar institution in his native town of Wurzburg. Birmingham five years later, founded the first orthopaedic hospital in England. In 1818, Leithof opened a similar institution in Lubeck. Between 1821 and 1826, orthopaedic hospitals were established in Bar-Le-Duc in France by Humbert, in Berlin by Blorner and Hammers and in Paris by Pravaza and Guerin. The credit of starting a novel orthopaedic sanatorium in the environs of Montpellier in 1828 goes to Delpech. Here rehabilitation was conceived by providing open pastoral playground for his patients to indulge in outdoor games and exercises. We may state that he was the first to conceive of the physiological imbalance of muscles as a cause of deformity. In 1833, Stromeyer in Hanover and about the same time Heine in Hague and Langard and Mausu in Copenhagen founded similar institutions. The present Royal National Orthopaedic Hospital in London had its beginnings as an orthopaedic infirmary by Little in 1845; it became in 1909 the Royal National Orthopaedic Hospital after amalgamation of three rival hospitals in the city of London.

In Italy, Ferdinande Carbonai started a similar institution in Florence in 1838, Hirsch in Prague in 1845, Roon in St. Petersberg in 1859, Barellai in Florence supplemented the urban hospital work by establishing a country sanatorium for certain of the handicapped children especially these suffering from tuberculosis of the bones and joints. He chose several sites at the seaside and the mountains. Open air sleeping accommodation, sunshine, good food and nursing formed the basis of this treatment. In Italy further developments occurred after the establishment of Institute Rizzoli in Bologna and Institute Dei Rachitici in Milan. These were the two great institutions which became famous under the direction of Codivilla and Vittorio Putti and Ricardo Galeazzi respectively. In New York, twenty public-spirited men finding that there was no medical relief for the ruptured and crippled children established a society in 1863. This hospital has become now a very well-known hospital for the cripples and in recent times Royal Whitman, an eminent orthopaedic surgeon brought this institution to the forefront. During the 20th century, Biesalski in Berlin and Lange in Munich and Spitzy in Vienna organised large institutions. Not only were the main specialist hospitals built in the city but also annexe hospitals were built on the mountain and the seasides. The first state hospital was built in the New York City in 1900 in order to relieve the strain on the hospitals built by the philanthropists with the result that other states emulated the good example.

Social service workers co-operated with surgeons interested in orthopaedics in accelerating the expansion of these hospitals. In 1902 Baschurch Home was started by the late Sister Agnes Hunt with encouragement given by the late Sir Robert Jones. In 1921, due to the popularity and the increased usefulness of this sphere of work, a hospital was started at Gobowen and it was named the Shropshire Orthopedic Hospital. In 1933, the same hospital was rechristened as the Robert Jones and Sister Agnes Hunt Hospital. This hospital was served as a model for the whole of British Isles. In 1908, Trealor Cripple Hospital was founded at Alton in Hampshire. In 1909, all the rival orthopaedic hospitals in London were amalgamated into one and was called the Royal National Orthopedic Hospital and in 1917, the Wingfield Morris Hospital at Headington was started in Oxfordshire. In 1907, Henry Frauenthal founded the third orthopædic hospital in New York City which was called the Hospital for Joint Diseases. This was the first of its kind which enlisted the specialists in other branches of medicine to visit this institution to solve other special problems related to the cripples. In fact, this hospital was so managed that it resembled an orthopaedic general hospital. In 1913, the Rotary Club of Syracuse started an institution for the crippled children. In 1920, the order of the Mystic Shrine of the Free and Accepted Order of Masons planned to encircle the country with hospitals for the care of crippled children. These institutions were placed somewhat distantly from other medical centres to prevent overlap of services. Shriners Hospitals were thus started at Shreveport (Lousiana), at Sanfrancisco, at Chicago, at Springfield (Mass), at Minneapolis, at Philadelphia, at Salt Lake City, at Spokane, at Greenville (South Carolina), at Portland (Oregan), at Honolulu and at Montreal. The surgeons

of these hospitals have contributed a great deal to the advancement of the orthopaedic speciality of childhood. To supplement the orthopædic service, an association for the aid of crippled children was organised early in this country. This was not a medical society. It transported children to and from the hospitals and also to and from the schools, in addition it supplied apparatus for needy cases and maintained a staff of field workers to supervise the carrying out of the medical instructions given at the clinic properly.

The Central Council for Care of Cripples is a notable organisation in British Isles. Sir Robert Jones was the originator of the scheme which still presents the ideal for satisfying all the needs of the crippled people.

It recommended:

1. A central co-ordinating body working with the Ministries of Health, Education and Labour.

2. Local committees for the care of cripples in every district.

3. Hospital schools for crippled children with open air wards where surgical treatment and education could proceed in unison.

4. Out-patient after-care clinics for the examination and treatment of children sent for examination, supervision of children discharged from the hospital school, and planning of employment of those of more advanced age.

5. Invalid schools, both day and residential, for the few children whose disability was so great that they could not attend ordinary classes.

6. Surgical wards for the treatment of adolescent and adult cripples who needed orthopaedic treatment.

The Ministries of Health and Education collaborated with the Central Council and encouraged local authorities to develop plans for the education and treatment of crippled children. All social, medical and benevolent organisations also worked in conjunction with the Central Council for the Care of Cripples.

In 1921, Edgar Allen started the Association of the International Society for the Rehabilitation of the Crippled Children. The main object of this society was to devote its energies to the medical and educational interest of 3,50,000 known crippled children in North America. A similar institution, the National Foundation for Infantile Paralysis deserves special mention. It was organised in 1938 by the Late President Roosevelt and has helped to a large extent to develop and discover treatments of value and also research.

In the industrial sphere Von Bismark was the first to promulgate a comprehensive governmental plan for the protection of the industrial workers. In Great Britain also many acts of legislation were passed of which the following are noteworthy:—

The factory shop act of 1901, the children's act of 1908, trade board act of 1909, Lloyd George national insurance act of 1911, the maternity child welfare act, Fisher educational act which made the education and treatment of physically defective children compulsory, the educational act of 1921 which sanctioned education for adult cripples. the workmen's compensation acts of 1906, 1925, 1931 and 1938. The disabled persons employment bill 1943, new education act 1945, the national health service act 1946, and the national assistants act of 1948.

In America, similar legislation on parallel lines have, been enacted but the social legislation did not meet all the needs arising out of changes in American life. The problem throughout American history has been complicated by the fact that except for industries engaged in interstate commerce which came under federal jurisdiction of Central Control and Regulation, working and living conditions have been regarded as the exclusive responsibility of the local and state governments. Thus industrial practices that are prohibited in one state are often permitted in neighbouring states. Yet great strides have been made in social legislation since the early days of industrial capitalism. Among the major legislative enactments were factory inspection, workmen's compensation legislation, laws regulating hours of labour, the legislation authorising control over health conditions in factories, Walsh Healy public contracts act, the fair labour standards act and the federal mines inspection act and the Smith Sears soldiers rehabilitation act, Fees Kenyon act which provided vocational rehabilitation for persons disabled in industry or otherwise and return to civil employment. Through the efforts of the Bharuch Committee on physical education, the national foundation for infantile paralysis, national society for crippled children were also established.

In India, the only legislation of importance is the workmen's compensation act of 1923 with amendments from 1936 to 1939. The sickness insurance act was brought to the notice of the Government of India in 1928 by the International Labour Conference but deferred on the plea of: (1) Migratory character of labour; (2) Workmen's habit of migrating to the village during sickness; (3) Lack of sufficient number of medical practitioners; (4) Opposition of labour to their compulsory contribution.

Though Industrial Insurance is on the anvil yet legislation has been halted due to factors beyond the control of the Health and the Labour Ministry, but we are assured that this would be introduced limited to Kanpur City. Our progress in this respect is halting and slow. India has mainly concentrated on the legislation to prevent beggary but has least thought of crippledom as a major factor responsible and no legislation has yet been thought of for the prevention and treatment of cripples.

The development of orthopædic teaching in hospitals in British Isles is of recent origin. The hospital status was that of the general surgeon in charge of an orthopædic department. To Charing Cross Hospital goes the first honour of employing a surgeon as an orthopædic specialist who had concentrated his work entirely in this branch in 1906. Guy's and St. Bartholomew's followed suit in 1912. Slowly and steadily more and more large-sized hospitals began to have orthopædic sections.

The development of accident service on an organised basis dates back to the first organised service established by Robert Jones for the workmen engaged in constructing the Manchester shipcanal 1888-1893. The Carnagie Illinois Steel Trust established a comprehensive scheme for the treatment of industrial injuries (1914-1918). In 1926 Vienna Accidents Insurance Company started a special hospital under the direction of Lorenz Bohler for the treatment of injured workmen.

In Great Britain, public pressure forced the Government to appoint an Inter-Departmental Committee of the Home Office and the Ministry of Health in 1937 " to enquire into the arrangements at present in operation with a view to the working capacity of persons injured by accidents and to report as to what improvements or developments are desirable and what steps are expedient to give effect thereto." In 1937, the report added " we have little doubt with the principles of the continuity of treatment and after-care until working capacity has been restored should be applied in the accident departments of hospital to the treatment of all injuries entailing disablement. We believe with the results of organised fracture treatment will lead to the adoption of similar measures for dealing with other disabling injuries." Rehabilitation as a programme was insisted upon and legislation was enacted which culminated in the National Health Service Act of 1946.

From 1900 to 1919, Great Britain, America and all the European countries including Australia and New Zealand have forged ahead in the discovery of cripples and the solution of their problems. The British Orthopedic Association, the American Orthopedic Association, American Academy of Orthopedic Surgeons and the International Orthopedic Association have become responsible bodies and are carrying on a crusade on behalf of cripples and have contributed a lot to the advancement of the science and art of orthopædic surgery.

India is the only country where orthopædic relief is still in the embryonic stage. The fact that we had 1·4 million beggars in India in 1945 should set us thinking. It is presumed that there are more now after the World War II and particularly after our attainment of independence due to the scarcity of food and difficulties in accommodation. It is unfortunate that individual alms given to such class of people encourage beggary. If only the alms-giving public should contribute *to a community fund* like the National Foundation, that capital could be utilised for supporting not only orthopædic institutions for treatment and rehabilitation, but also vocational training centres for instilling into the minds of cripples and disabled, the dignity of labour and the satisfaction of independent existence. From 1925 to 1940 the first recorded statement of injuries, after the passing of Workmen's Compensation Act shows 11,000 deaths and 3,49,000 disablements for which compensation was paid. A recent statistical survey of industrial accidents in 1947 shows that there were 1,011 deaths, 3,228 permanent disablements and 49,335 temporary disablements. We know fully well that these temporary disablements if not rehabilitated become permanent disablements. In industrial hospitals and even in teaching general hospitals where these patients are admitted there are no facilities for rehabilitation. It is estimated that a sum of Rs. 33,26,495 has been spent in compensation in 1947 but this has not solved the sicio-economic problem which minimises wage-earning capacity and in a large number of cases, increases the problem of beggary.

The physical standard of the Indian Nation is below par and demands a study based on the analysis of 2¼ million recruits for the World War II, nearly 1 in 5 were rejected after medical examination. Out of these rejected 1 in 10 were due to static physical disabilities which were capable of correction in childhood and adolescence. The method of recruitment for the Indian Army is on a different basis from that in Western countries in an emergency like a war. In India upto now it is purely on a voluntary basis. Retired non-commissioned officers went from district to district to select recruits whom they considered suitable from their ample experience of the physical requirements of the army. Rejection of 1 in 3 in a mass mobilisation between the ages of 18 and 35 set America and Great Britain thinking. They set up a manpower committee. The National Health Act may be considered as an ultimate outcome of this investigation in Great Britain. Rejection of 1 in 5 of selected men should make us think also. The causes which sap the adolescence of a nation are many in India. Public health and orthopædic science can be harnessed effectively to improve the physical standards. Orthopædic science is not concerned merely in the putting together of broken bones and the rehabilitation of the deformed and derelict but also it utilises the knowledge of the cause of cripples based on the researches in the preventive aspects. This problem should have a great priority if it is our aim to improve our manpower and conserve it for agriculture, industry and the army. In India even if these defects are recognised early in children there are no centres where these children could be sent for treatment and rehabilitation. General hospitals have not sufficient accommodation even for acute traumatic cases not to speak of other type of

diseases leading to deformities. Moreover, in none of these are there well organised rehabilitation centres.

The accident service in general hospitals in India requires a thorough overhaul. There are not sufficient beds for the large number of street accidents and industrial accidents. Even after the acute phase these poor individuals are left to themselves without proper rehabilitation. Even where there are orthopædic sections the number of beds allotted are small, staff inadequate and the equipment and facilities are far from satisfactory.

It is also a regrettable feature that we have not got sufficiently qualified orthopædic surgeons on the staff of industrial and railway hospitals. Some teaching hospitals have in recent times qualified orthopædic surgeons but the facilities provided by the management are trifling and inadequate.

At the same time in the United States, orthopædic surgery was recognised and the orthopædic association was active but the number of men carefully trained in that profession was not large and the general surgical profession was not friendly to the ortnopædic activities. In Great Britain also the general surgical group was not also co-operating. The first governmental recognition in Great Britain and America occurred in 1917, as a result of professional accomplishment of Sir Robert Jones and his team of workers in World War II. Recognition of orthopædic speciality has now been given by the Republic of India but the financial position stands in the way of the establishment of a Central Institute for the training of orthopædic staff for the whole of India. It has now been well proved that cripples after rehabilitation can be suitably employed in industry in job analysis and rating. The S.R.C.C. started a physiotherapy centre in 1947 and is passing through its infant stage. Within three years it has become a children's orthopædic hospital of ten beds with prospects of expansion to 50 beds and with facilities for rehabilitation of nearly 160 cases per day. It has also an ambitious programme for building a central orthopædic hospital for the training of doctors, physiotherapists, and others interested in this subject. This society at present is contemplating to start a physiotheraphy school. It is the crying need of the time. In India there is not more than one qualified physiotherapist for ten million people. Their services are not available to the poor as they cater only to those who can afford to pay for their services. A few general hospitals have some standard equipment for rehabilitation purposes but there are none to operate it. India is now putting up memorials for those who have done yeoman service to the country and it is opportune to quote what the late Sir Robert Jones, the father of modern orthopædic surgery, had said in a paper entitled ' Problem of the disabled ' published in 1918. " Are our memorials to be spiritual or material, living and permanent, dead or cold? For my part, I have no hesitation in saying that cold marble or perennial brass has no re-echoing voice to me. My feeling is that the heroic spirit that sent our beloved dead to their end should be reflected in an equally heroic effort on our part to make and keep the nation efficient." The result of this appeal has been that over 50 central orthopædic hospitals and over 500 clinics are now found scattered all over the British Isles. This applies equally well to our country as we are thinking of commemorating our great men in cold marble, brass or bronze. Sister Agnes Hunt and Robert Jones Hospital led the way in Great Britain and served as a model for the establishment of similar institutions. It is also our wish that similar central institutions will rise modelled as the Children's Orthopædic Hospital, Bombay.

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PROBLEMS OF PRODUCING AND USING FILMS AND FILMSTRIPS FOR HEALTH EDUCATION IN INDIA

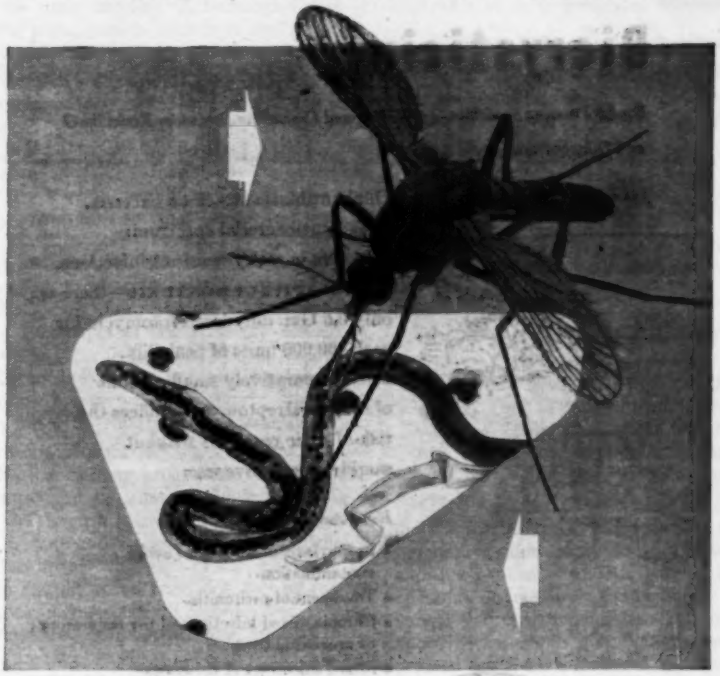
DONALD F. EBRIGHT, M.A., PH.D.,

In a land where 85 per cent of the population cannot read or write the value of audio-visual aids is being increasingly realized by Government officials, social service workers and educationists who with the film producers are giving considerable thought to the role of the educational film.* Among this group of pioneers are doctors, nurses, medical superintendents and health officers, on the district, state and National levels who are concerned with the problems of making and using films and filmstrips for health education.

Let us remember that while all public health workers come from different backgrounds they have one purpose: to get the masses to understand the meaning of " good health " and how it is achieved and maintained. This presupposes an understanding of the causes of ill health (flies, adulterated food and bad air); and the methods and tools to eliminate these causes (D.D.T.; pure food and fresh air). The people

* By " film " this paper restricts itself to the 16 mm. sound film, unless otherwise indicated. The " filmstrip " and "2 × 2" slide" is dealt with in a later section.

THE **ORAL** TREATMENT FOR **FILARIASIS**



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RELATIVELY NONTOXIC—there is only 0.5 Gm. dihydrostreptomycin for each 400,000 units of penicillin. The comparatively small amount of dihydrostreptomycin reduces the risk of toxic reactions without sacrificing effectiveness.

Recommended for:

- Prophylaxis of wounds to avoid contamination
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- Chronic mixed infections of the respiratory or urogenital tract
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Vials containing 400,000 units of fortified procaine penicillin and 0.5 Gm. dihydrostreptomycin sulfate

"DICRYSTICIN" AND "CRYSTICILLIN" (REG. U. S. PAT. OFF.) ARE TRADE MARKS OF E. R. SQUIBB & SONS

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must be taught hygienic habits (Note film: "Environmental Sanitation") both for personal living and community life. They must be made aware of the consequences if approved scientific procedures are not followed. (Note film: "Water—Friend or Enemy"). Since the achievement of "good health" implies nutrition and the understanding of balanced-diet it is necessary for the public health worker to deal with the best use of available foods.

Actually the public health worker will need to utilize a variety of simple and inexpensive visual aids in person-to-person, family-to-family and village-to-village contacts, such as charts, posters, pictures, the flannelgraph and models. These are indispensible aids in litting the level of health and hygiene among India's masses. We presume then the fullest use of scissors, paste, cloth, paper, clay, etc., in making and using these patent non-projected aids; but we will confine this paper to a consideration of projected pictures, 16 mm. cine film, 35 mm. filmstrips and 2" x 2" slides. This paper is not primarily concerned with the specialized clinical films for medical audiences (*i.e.*, "Prefrontal Lobotomy in the Treatment of Mental Disorders") but will concentrate upon the health and hygiene films suitable for general showings.

India has not lost sight of one of the major contributions of the war-training programme, namely, that educational films can be successfully employed in a broad health and hygiene campaign. Hence, we are not surprised to find audio-visual aids being included in all new educational schemes. While education in India is a State matter, visual education will be run by the Central Government to ensure co-ordination. Some provincial governments are conducting local experiments which are all to the good. At the present moment we are waiting to see how the Films Division of the Ministry of Information and Broadcasting is going to function. But the fact is that on March 28th, 1950, this promising Department was not ready yet with its scheme of 16 mm. sound prints.

The purpose of the Films Division is to produce and distribute informational films on educational, social and cultural subjects for India and abroad. Six production units are to be formed of which one is to produce films for rural areas and which will be most closely related to the health education program.

A Committee of Visual Education has been created by the Central Government with the following terms of reference: (1) To investigate the use of films in primary, secondary, university and adult education; and (2) To organize the Government's Central Film Library. It intends to have as part of its Central Institute of Education of Department for Audio-Visual Education which will function as an All-India training college for teachers.

Reports from certain areas indicate that: (1) The Government of Madras has sent an officer to Europe to study Audio-Visual Education; (2) In Delhi a projector is being used as part of an Adult Literacy Scheme; (3) Orissa has three mobile units; (4) the Government of West Bengal is using sixty 35 mm. filmstrip projectors for rural propaganda; and (5) the Central Provinces has a fleet of twenty-two mobile units. Health Education ranks high on the list of objectives in these provincial schemes.

I. Motion Pictures

With this general background let us now face the specific problems involved in the production and utilization of: (1) films and (2) filmstrips for health education purposes.

We will consider:

(1) The sense of need for more effective tools and techniques;
(2) The desultory use of films;
(3) The lack of understanding of the problems involved;
(4) The dearth of equipment and materials;
(5) The effectiveness of foreign-produced materials;
(6) The need for indigenous films;
(7) The association of motion pictures with entertainment and excitement; and
(8) The need to understand the philosophy underlying mass media communications.

The Sense of Need—1. The sense of need for more effective tools and techniques is evident in all progressive educational circles because the use of book and the spoken word has proved inadequate for the demands of free India. But herein lies both hope and danger. It is a hopeful sign that officials are eager to adopt new methods and that discussions of visual aids proceed on "high levels." But the danger is that agencies and organizations seeking to implement government targets will embrace the use of audio-visual aids without a thorough understanding of their use or possibilities and expect to reap miraculous results with less effort. It takes time, energy and money to utilize visual aids. Already there are evidences of too *hastily* built "Mobile Units," with carelessly aquired equipment and inadequately trained operators resulting in disillusionment and a consequent setback to the audio-visual movement. Some educators are fearful of the new development while others rush to embrace every teachnical device without considering its educational merits or demerits: Our problem in India is to discover a reasonable attitute midway between the two extremes.

2. *The Desultory Use of Visual Aids*: An overall picture of health education in India will reveal that the use of audio-visual aids is desultory. We find carefully planned, systematic and consistent visual programs in few institutions. All too often the work is built around an enthusiastic individual who is subject to transfer, and the work stops. There is a lack of Camera Clubs, Operator's Training Classes, Film

Evaluation Services, Documentary Clubs, Workshops and Institutes to develop local talent for carrying on a long range programme and ensuring continuity.

The desultory use of visual aids is partially due to the lack of adequate equipment and accessories. The Civil Surgeon may have a 16 mm. sound projector but he often lacks a portable screen, spare bulbs, a converter for use in D.C. areas and a microphone to give a running commentary.

Then frequently leaders in the health education movement are seniors who are more at ease in the use of older methods (lecture, question and answer) with the result that "Pictures" are used as a bait or reward for a programme. As the Special Officer for Education announced on tour: "at the end of the programme there will be movies."

3. *Lack of Understanding of the Basic Problems Involved*: Frankly, all educators, and this includes Health Officials, must be led to realize that learning to let pictures speak for themselves, and to let 16" transcriptions stir the listeners to create their own mental image is equal to learning a new language. This is a basic problem in India where the verbaliser has been venerated for centuries and the District Health Officer has in the past learned to paint world-pictures with an occasional reference to a chart or poster. To-day he has a well-equipped mobile unit with a glittering array of new tools which require that he takes cognizance of the fact that the projected picture and the recording "speak" a new language. This new language is infinitely more powerful than the one he has been using. When this basic lesson is fully grasped the educator will begin to study this new media with the concentration he expends upon Hindi or Sanskrit. The serious official does not toy with Hindi and no more can he afford to toy with the new language of mass media communication.

4. *The Dearth of Equipment and Materials*: There is a marked dearth of equipment (projectors, etc.,) and materials (films, etc.). Due to the rigid import regulations and the price of equipment since devaluation a mere trickle of equipment is entering India. Travel from Delhi to Madras, or Bombay to Calcutta, and you will hear a chain of requests for projectors, screens, turntables, microphones and films. This point can be certified by talking with the heads of such educationally alert firms as Ama Educational Limited; Educational Films of India; Patel India Ltd.; Kodak Ltd., etc.

How soon can Indian industry begin to meet this demand? May I give my personal opinion based upon extensive travel and wide contacts. Certainly the production of the mechanically simple opaque projector and the 35 mm. projector for filmstrips and $2" \times 2"$ slides should impose no serious problems. It is to be hoped that Indian industrialists will enter this field at the very earliest opportunity. However, in the field of the 16 mm. sound projector, a precision built machine, there are technical problems and practical considerations which may rightly delay the indigenous manufacture of sound equipment for some years.

Where can films be secured? The following table was compiled for North India but is a fair indication of the condition of film-hungry India. Possibly the excessive duty of four annas per running foot on all but a very small group of "educational" films (as interpreted by the Bombay Board of Censors) accounts to a large degree for the sub-normal quantity of films for sale or rent. Sources of movie rentals in India are:

16 MM. SOUND

1. United States Information Service, 54 Queensway, New Delhi; or Bombay, Calcutta, (only the one in your area will serve you) (Informational, education, entertainment, war).

2. British Information Service, Eastern House, Man Singh Road, New Delhi. (Education, informational, documentaries).

3. General Motors, India, Ltd., P. O. Box 39, Bombay No. 1. (Technical, engineering, few general).

4. Metro-Goldwyn-Mayer, India, Ltd., P. O. Box 22, Pratap Buildings, Connaught Circus, New Delhi. (Current and older major theatre feature films, selected shorts).

5. Ama Ltd., Canada Building, Hornby Road, Fort, Bombay. (Comic, entertainment, travel).

6. Nonogram Film Exchange, Ltd., Excelsior Theatre, Wallace St., Bombay, (Dramatic, gangster, westerns full-length entertainment films).

7. Patel, India, Ltd., 190, Hornby Road, Bombay. (Entertainment, educational).

8. Radio Corp. of India, P. O. Box. 111, Hazratganj, Lucknow. (Some as Patel).

16 MM. SILENT

1. British information Service, Eastern House, Man Singh Road, N. Delhi. (Educational, documentary).

2. Ama Ltd., Hornby Road, Bombay. (Entertainment, travel).

3. Patel, India, Ltd., Hornby Road, Bombay. (Educational, entertainment).

4. Bureau of Education in India, Library of Educational Films, Educational Secretariat, New Delhi. (Educational).

5. U. P. Civil Secretariat, Information Directorate, Lucknow, U. P. (Indian Information).

6. Other Film Source Possibilities: Your Provincial Dept. of Education, Film and Camera Companies, Other Information Services, Canadian, Russian, etc., and Publicity Depts. of Commercial firms.

5. *The Effectiveness of Foreign Produced Materials*: How useful are foreign produced films for India? The bulk of available 16 mm. films, filmstrips and 2" × 2" slides on health subjects are western produced. While this is not a healthy condition this material is by no means unusable. In other words, it is not correct to categorically praise or reject this body of material. There are foreign films which are useless as well as films which are very useful, if correctly screened.

Because there are relatively so few silent films this paper is chiefly concerned with sound films. It must be noted, however, that there are educators who prefer silent films because they tend to move more slowly and a vernacular commentary can be given to carry the health message.

There are, moreover, 16 mm. sound films in English, made for Western audiences, which can be used as they are for limited English-speaking urban audiences. But in order to reach the rural masses, and that is a major aim of the Health Education Programme, the sound track must be "cut" and a running commentary given in the regional language. An excellent example of this type of film is the Walt Disney cartoon series distributed by the Institute of Inter-American Affairs, Washington, D. C. These 16 mm. color sound films run 10-12 minutes and are in English or Spanish. Let us examine one and see now its content and purpose.

In "Planning for Good Eating" the principles of nutrition are taught by animated cartoons, "Careless Charley," and his little house and farm somewhere in South America, is the chief figure. In this film the different kinds of food—starchy, animal and vegetable—are shown and what they contribute to human health by supplying energy, muscle and bone. There is an emphasis upon goat-keeping for a supply of milk for the children. Here is a film which can be recommended for health education in India. The details (shape of house and breed of goat) are minor for the basic health needs are universal. The Latin American background is nearer India than a corresponding North American farm. A commentary with a minimum of explanation will make this film understandable. Others in this series include; "Environmental Sanitation," "Hookworm," "Insect as carriers of Disease," "Infant Care," "Tuberculosis," "Water—Friend or Enemy," all of which the writer has shown to many audiences in rural and urban India. On a recent occasion where the writer was presenting health films, Rajkumari Amrit Kaur, New Delhi, Honourable Minister for Health for the Central Government presided, and expressed her great hope that visual aids might be used increasingly for spreading health education.

On the other hand there are Western films with a more limited use. Such a 16 mm. sound film is "Menstruation," produced by the International Cellucotton Products Co., Chicago, Illinois. The technical quality is very good. While the physiology of menstruation, the rules for conduct with reference to it, the diagram drawings of the female organs and the psychological implications are treated in a matter-of-fact manner the "American girl" and "American background" present a more alien look than does "Careless Charlie's farm." This film would be limited to a few girls' schools, very Western in atmosphere, and women's groups, where even so the American background would need explanation.

It is now obvious that the usefulness of a film for India can only be established after reviewing it and making an objective evaluation. The writer discussed this point at length with Mr. B. S. Kesavan, formerly Curator of the Central Bureau of Education, who has been a friend of the educational film for years. He had just spent a week viewing some 300 American short subjects with a view to purchasing films for the Central Government. He rejected over 50 per cent.

If we compare two films from the same health series produced by Coronet Films, "Safe Living at School" and "Cleanliness and Health" we will see that the first has little usefulness for India while the second film could be used. In the first film two children, Ted and Ruth, are members of the Junior Safety Council, a situation with no parallel in India. But in the latter film David who believes that "A little diet won't hurt you" goes to his doctor and observes germs through a microscope. The world of microphotography brings America and India together. The germs on David's hands are the same as Ram Duttai. This film could be useful in India for health education.

The Encyclopædia Britannica Health and Hygiene 16 mm. films can be used generally in India. I have projected "Tuberculosis" and "Heart and Circulation" to many village groups with a Hindustani commentary bringing a new understanding of the menace of tuberculosis and a new appreciation of the wonderful muscle, the heart. British Information Service has an excellent list of Health and Medical films of which "Your Children and You" series can be highly recommended.

6. *The Need for Indigenous Produced Film*: It should be obvious now that while we endorse the use of selected Western produced material for use in India we must work towards the production of a large footage of India-made health films. If any material is to be understood it must be built around the familiar.

This raises the question of language again. Even a film in Hindi is not enough to reach the average villages for the film ought to speak the *dialect* of each area. The lack of funds will probably prevent the recording of as many dialects as would be educationally beneficial. The only solution is to cut the Hindi sound-track and furnish a trained commentator for the regional language of the respective group.

Some recent health films produced in India include: (1) The United Nations Organization sponsored trio: "Mother," "Child," "Community" produced by Paul Fils of Documentary Unit India, which was a most commendable project. No foreign actress could take the audience so close to the heart of India's rural health problems as Sita Devi, the Social service Worker. (2) "Uddhar," produced by Mothwane, Ltd., for the Prohibition Board, Bombay, was made to influence the masses by an educational approach against the consumption of alcohol. (3) "Saput—Kaput" (Good Son—Bad Son), a 22 minute black and white health film with Hindustani commentary is another government produced prohibition film released through Association Educational Films, Ltd., Bombay, (4) "A Tiny Thing Brings Death," produced by Documentary Unit India for the Imperial Chemical Industries (India) Ltd., is a film which could play a vital role, in promoting Malaria Control compaigns. These are a few of the current films produced in India for health education but it is obvious that a much larger quantity of film is required if the shift is to be made from foreign production to indigenous production.

The dearth of independently produced or "sponsored documentary" films is partially due to the policy of the Films Division of the Ministry of Information and Broadcasting. Every cinema is now required by law to screen a certain footage of film which has received an Approval Certificate granted by an Advisory Board appointed by the Government. As only 52 certificates will be issued each year, with 36 to be produced by the Films Division, that means only 16 certificates are left for independent productions, provided the name of the sponsoring company is not in the titles. The exhibitor who is loaded down with "approved" films is loath to use a "sponsored documentary" ("A Tiny Thing Brings Death," "Kurvadi Road," by Ciba Pharma, "The Doctor's Advice,' Horlicks, etc.). The independent producer is hesitant to invest in film which may be useful for health education purposes when he realizes the opportunity for sale or release through cinema booking channels is very small. So the question still remains "Who is to produce the quantity of health education films required for India."

7. Having made a case for the use of motion pictures because the film correctly used has an undoubted value in enlarging public appreciation of the principles of good health and the methods required to achieve it, let us consider two dangers inherent in their use: These are: (1) the films' close accociation with entertainment and (2) the "excitement" element. The motion picture has been associated very largely with popular entertainment. Consequently the educational film starts with an initial handicap. Most people go to the cinema for entertainment which may be interpreted as the "absence of any matter which requires concentration or undue mental activity." Thus serious educational content is considered an intrusion. One effort to meet this opposition resulted in the cartoontype of instructional film, which in some cases has been successful, as with the Walt Disney series but in many instances any educational value has been lost amid the comi-cappers of animals or men.

Then we must be on our guard lest the initial popularity of a film program be equated with educational result. Go to any village and unlid the jeep or mobile-unit, set up a screen and project any film. There will be an excited audience of hundreds or thousands. Nothing may have been learned. The writer projected films to audiences up to 12,000 in the Refugee camps of New Delhi in 1948. Yet one seriously questions any profound health learnings. Conditions and habits remained much as they were..... Let us face the fact that most crowds get entertainments, diversion and excitement from sound movie programs. This is alright, provided we do not equate this with the learning process. The film is an aid in health education and presupposes careful use and follow-up.

8. *The Need to Understand the Philosophy underlying Mass Media Communication*: In the average Indian village, with the slow tempo, it can always be said that the motion picture is fast. Moreover the lack of electricity and the dearth of flat pictures has limited the average man's experience in viewing pictures after dark. Hence it is an effort to translate image (symbols) on the screen by means of artificial light into reality. Dr. George Pearson, of the Colonial Film Unit (British), in "The Film in Colonial Development" (March 1948, pp. 24) writes: "Since 1942 we have maintained a close examination of educational and instructional films from every available source. Of 1,500 such films that we have viewed only ten might be useful to us for our illiterate audiences, but even those ten would need drastic cutting and reshaping. The final result could be nothing more than makeshift."

Despite these warnings of dangers involved in the use of motion pictures for health education among the masses let us not react so violently that films are neglected and only India-produced material is used. Our guiding question should be "Do they serve the purpose of spreading health information?" Then it is our duty to retain adequate control over audience, setting, equipment and film so that our purpose is achieved.

If we would retain control over our audiences, in using films or filmstrips, we need an increased understanding of audience reaction. One gains the impression from conferences in India that educations are more concerned with acquisition of projectors than in acquiring a personal knowledge of the underlying philosophy of mass communications. It is hoped that seminars, workshops, and institutes can be held for educators and officials all over India so that they can come to

grips with " semantics "—the effect of the medium and the mode of expression upon a given audience. There is no excuse for saying things in the wrong way if the right way can be apprehended. The progressive Health Visitor may be compelled to put up with an " Old Dog " who scorns new tricks, but it is far safer this way than to arm the " old dog " with a 25 watt Public Address System:

We will use motion pictures for health education because: (1) the motion picture has the ability of creating the *illusion* of movement which has compelling power: (2) it has the advantage of closer attention since *forms* are generally projected in a darkened room: (3) it has the advantage of bringing a large number of images before the audience in a short time, so that the life cycle of a living thing can be studied in a few minutes; (4) it can increase the picture-size enabling thousands to follow the message; (5) it is an aid in changing attitudes and habits.

II The Filmstrip

The 35 mm. filmstrip is not widely known or used in India as yet. When the writer filmed and produced 360 black and white filmstrips on "Malaria," " Flies," " Hookworm," " Good Water " " Tuberculosis," " Itch," and " Cholera " there was not a commercial company producing this medium. Yet the filmstrip has been established as a practical and inexpensive aid for health education and its use must be promoted.

What is a filmstrip? A filmstrip is a series of related single photographs (frames) interspered with titles to tell a direct story on a strip of 35 mm. film. The story may involve the use of 30 to 100 frames of film. Thus a 5 foot piece of 35 mm. film with 100 frames will tell a story which otherwise would require 400-800 feet of 16 mm. cine film. The filmstrips and 2″ × 2″ slide has largely replaced the old " magic lantern " with the heavy and cumbersome glass slides.

There are really four forms to consider: (1) the standard glass slide 3¼ × 3¼ inches becoming obsolete; (2) the 2″ × 2″ miniature slide which consists of individual frames from a filmstrip mounted in glass-binders; (3) the filmstrips and (4) the 16 mm. microfilmstrip which we can disregard in this paper.

Because of the availability, portability and economy, we will concentrate upon the 2″ × 2″ slide and filmstrip. The miniature slide, usually spoken of as a 2″ × 2″ slide, has a picture size commonly 1″ × 1½″ or 2·5 cm. × 3·8 cm. This size is based on the 35 mm. film. Colour pictures taken with 35 mm. can be projected directly as slides for they are transparentis; black and white pictures need to be copied on positive film for projection. There are a variety of frames for binding the cup-up 35 mm. film from very inexpensive carboard binders to glass covers with plastic binders. Where slides are to be used much glass mounting is advisable.

The filmstrip is a set of slides on a piece of 35 mm. film which moves through a projector, picture by picture, or frame by frame. The filmstrip is the lightest and least expensive of the 35 mm. media and is excellent to present a fixed series of pictures. If one wants flexibility, *i.e.*, the use of a few pictures out of a series, slides are to be preferred.

The filmstrip or slide projector is simple to operate. Each picture is flashed into position by a turn of the knob on the spoke wheel. Personal comments may be " live " or recorded on discs or tape to make it a sound programme. With each filmstrip there is a printed script giving a frame by frame commentary.

What are the advantages of the 35 mm. filmstrip and projector? The leader is able to pace the commentary and the speed of the filmstrip to meet the needs of the group. This is most helpful when a vernacular commentary has been added to a Western produced filmstrip. The equipment involved is portable, simple to operate, compact and inexpensive. Models can be operated on electricity, storage batteries gas-electric generator or with a Petromax-type lamp. Films can be produced easily and very cheaply. They can be projected in a semidark room which is a value in extension service.

There are to-day tens of thousands of filmstrips for sale covering every phase of school curriculum. We are particularly fortunate in the health and hygiene resources in the filmstrip and slide field. Let us consider one filmstrip, "Your Teeth and your Health" distributed by the Society for Visual Education, Chicago, Illinois, for the American Dental Society. The contemts include actual photographs of children in situations illustrating the care and neglect of teeth. Special attention is given to correct brushing of teeth and a balanced diet while the back-ground is typically American one lessons are generally applicable and will be useful in India until something better is produced indigenously. Substitute " chewing sticks of neem " for toothbrushes and the same lessons can be transferred.

Because filmstrip production is so simple and can be produced in any amateur darkroom it might be well to note some of the factors involved in home-made filmstrips. Having chosen the core idea we must consider the picturization possibilities inherent in the idea. Next we consider the point of view to be expressed in the filmstrip which is one phase of the total philosophical consideration. The audience must be considered at this stage and a clear understanding reached as to where and when and with whom the filmstrip will be used. My filmstrip, " Good Water " would serve little purpose in a city for it was designed for use in a typical village. Vocabulary factors, language and audience needs should likewise be in mind. As the picture sequence grows the script must be completed with titles, the commentary and

method of continuity formulated. The photography, graphic problems, laboratory requirements and publicity are not now our chief concern. But topflight filmstrips do not grow by using a series of photographic discards. A good filmstrip is an achievement.

As far as the writer knows personally the West Bengal Secretariat is the only governmental agency in India producing and using propaganda filmstrips. "Mahatma Gandhi's Last Rites," is just one of a series of such filmstrips used with 60 projectors which circulate throughout West Bengal as part of their information service. This is a wise move and worthy of duplication elsewhere.

In conclusion, we can repeat that good health calls for established health habits which involve the learning of scientific facts about food, disease and medical care. For mass education a variety of aids is required among which are the indispensible motion picture filmstrips and $2'' \times 2''$ slides.

CASE NOTES

SACRO-ILIAC TUBERCULOSIS TREATED WITH STREPTOMYCIN, PAS AND SURGERY

J. D. KANAKARAJ, M.B.B.S.,

Civil Assistant Surgeon, Government L. W. L. Sanatorium Tirumani, Chingleput Dt.

The patient was a young female, aged 16 years, belonging to a rich family whom I was called in to see as a consultant on 8-11-50. I found the patient lying flat on her face, emaciated and in a very poor general condition. She had two bed-sores, one each on the anterior superior spine of the iliac crest which were so deep as to expose the bone. She was pyrexial, toxic and so emotionally upset that it was after great persuasion that she permitted herself to be examined. She had a large fluctuant swelling over the left buttock, two sinuses each discharging purulent pus, one at the lower edge of the right buttock and the other in the middle of the right thigh. There was marked tenderness over the sacro-iliac joints on pressure applied directly or indirectly. Movements of the pelvis or around the hip joints were extremely painful and the slightest attempt caused the patient great pain. A clinical diagnosis of sacro-iliac tuberculosis was made. A skiagram of the part confirmed the diagnosis. There was no focus of infection in the lungs. The patient was married in April, 1950 when she was in good health. She had been ill for the last three months and her resultant mental condition could well be imagined.

TREATMENT

The patient was placed on the following treatment:—

GENERAL:

(*a*) A diet rich in calorific and nutritive value, consisting of eggs, milk, ghee, vegetables and wheat.

(*b*) Medicines:

(1) Hæmatinic capsules with folic acid one t.d.s. (2) Folvite 1 c.c. I.M. once in 3 days. (3) Calci-Ostelin 1 c.c. subcutaneously once in 3 days. (4) Calcium gluconate 10 c.c. 10 per cent I.V. once in 3 days. (5) Probepex—One tablespoonful b.i.d.

(*c*) General nursing: Daily sponging, attention to mouth and back.

2. LOCAL: (A) *Operative*—

On the following day under general (ethyl chloride and ether) the cold abscess was first aspirated and found to contain thick caseous pus. It was then incised when two kidney-trayfuls of pus were let out. An explorative finger indicated a large cavity leading to the region of the sacro-iliac joint the surface of which was craggy and friable. A curette was introduced and the whole area well curetted. A drainage tube was introduced and stitched on to the skin. The other two sinuses were enlarged and similarly explored, pus evacuated and drainage tubes introduced and stitched. The length of the drainage tubes measured between 6 in. to a foot. Actually a urinary catheter was laterally punctured and introduced into the lowermost sinus, as a drainage tube of such a length was not available at the moment.

(B) *Post-Operative*—

The patient was then placed on her back on an airbed with air cushions to support her legs. Although this caused great inconvenience and discomfort to the patient, it was insisted upon for two reasons, (1) to relieve pressure on the pressure sores over her anterior iliac spines and (ii) to let gravity facilitate drainage of pus from the cavities. The result of this was most gratifying. The patient began to drain so rapidly that dressings for the first few days had to be changed very frequently and the bed-sores began to heal at a rate far beyond expectations. Daily or oftener in the beginning superficial dressings of half saturated magnesium sulphate plus irrigation of cavities with 5 per cent PAS—(Osacyl Ciba) solution were done. After a period of 12 days the wounds were completely dry except for a slight serous discharge. The drainage tubes were then snipped off (half an inch each day) while irrigation through it was continued every day with Osacyl solution.

3. SPECIFIC—The patient was put on streptomycin 1 gm. every day in one injection and PAS (Osacyl tablets) 12 gms. daily. She had a total of 45 gms. of streptomycin.

PROGRESS

The patient made rapid improvement. All signs of toxicity cleared within a few days. Her appetite improved and she began to take an interest in herself. She regained her emotional stability and began to be cheerful and happy. The bed-sores were the first to heal and the wounds healed up at the end of a month's treatment. The patient was then gradually got out of bed and encouraged to walk a little at a time. By about the 45th day the patient had gained 30 lbs. in weight, was moving about the house cheerful and gay.

DISCUSSION

There are several points of clinical interest which have prompted me to record this case.

(1) The remarkable rapidity with which the bed-sores healed demonstrating the time-old axiom—to heal a pressure sore, first and last, relieve the pressure.

(2) The extremely short period of one and a half months in which the patient made a recovery. This I can only attribute to the specific therapy. Strepto-

mycin and P.A.S. has been widely claimed in literature to have beneficial effects when used complementarily in bone, gland and renal tuberculosis and this case bears this out. They greatly reduced the period of treatment of a case which I feel by ordinary or conventional methods would have taken a long and protracted period. These drugs have a definite place in the field of surgery of bone and gland tuberculosis and with these two new powerful weapons in his armamentarium the surgeon can not only look for better results but expect the outlook and prognosis to be greatly altered and the period of treatment curtailed to a very large extent.

(3) Local and topical use of P.A.S. In this case the local improvement and smooth and uneventful healing of the cavities and final closure of the wounds were to a good deal attributable to the daily irrigation with 5 per cent PAS preparation (Osacyl).

One point, however, which I would like to stress is this: I was fortunate in that the patient belonged to a very rich family and so could well afford all the expensive drugs and other items such as air-bed etc., for her treatment. This would have been far beyond the means of an ordinary person. This economic factor should not be overlooked in the proper appraisal of this case. I am happy to say the patient left for her father-in-law's house soon after. I have advised her against a pregnancy for 3 years and thereafter to seek medical attention during one, as I am doubtful of the mobility and functional efficiency of her sacro-iliac joints during pregnancy.

Suptum examination, hæmatological estimations and sedimentation rate should have been done before and after treatment but as this case was treated in a mofussil area with very limited facilities I was unable to do them.

ACKNOWLEDGMENT

I am grateful to my wife, Dr. (Mrs.) M. Kanakaraj, B.SC., M.B.B.S., for having assisted me in this case and in preparing this case report and to Dr. H. Paul, M.B.B.S., Superintendent, Government. L.W.L. Sanatorium, Tirumani, Chingleput Dt. for having encouraged me to report it.

DETACHMENT OF THE RETINA

R. P. DHANDA, M.B. (CAL.), D.O. (LONDON),
Indore

Mrs. R. N. 32 years old, was brought to me on 12-9-1950 with a complaint that not one of the three pair of glasses prescribed for her during the last 2 years suited her. Her vision at that time was:—

R. V.—Counting of fingers at 7 ft.

L. V.—H.M. only.

She had an external squint in the left eye which had lost vision due to retinitis proliferans of long duration.

In the only functioning eye, I discovered a detachment of the retina extending from the ora serrata upto about two disc diametres from the macula and extending nasally and temporally to about the horizontal level. The detachment was due to disinsertions at the ora serrata which were visible with a fully dilated pupil. The level of elevation of the retina varied from 8 to 12 diopters. There were fine vitreous opacities and a complicated posterior polar cataract. The field of vision had correspondingly fallen down to near the fixation point in the upper part. Even though the eye was moderately myopic, glasses would not improve her vision.

TECHNIQUE OF OPERATION

As it was a case of disinsertion at the ora serrata, the proposed line of operation was 11 mm. from and parallel to the limbus in the lower side. I incised the conjunctiva and Tenon's capsule at 7 mm. from limbus below and lengthened it to about an inch in the horizontal direction. I exposed the sclera and defined the inferior rectus muscle. I reflected the conjunctiva till I reached the line of the proposed operation and cleared another 2 mm. beyond. Complete hæmostasis was obtained. I lifted the inferior rectus on the hook, and made eight (4 on either side) applications of surface diathermy in line at 11 mm. from the limbus. Each application lasted about 5-7 seconds with the amperage needle at 35 milliamperes. Each of those applications left an area of light brown discolouration except one which actually charred the spot. This charring may be due to some fault of the machine or in the main current. I examined the fundus with an ophthalmoscope after every two applications and noted that it produced a dull grey reaction on the retina, just what I expected and wanted.

I then made a cautery puncture through the first surface-diathermy spot temporal to the inferior rectus with 2 mm. needle and applied the sucker on the puncture. I could aspirate a few drops of serosanguinous fluid. I made another puncture on a similar spot on the nasal side and clear serous fluid seeped out itself through this puncture.

I examined the fundus again and noted that the retina had gone back to its place and apart from the grey reaction there was no charring inside.

I put back the reflected conjunctiva and stitched the cut margins, put a few drops of penicillin and bandaged both the eyes. The patient was gently carried back with head put between sandbags.

Post-operative period—The patient was kept in the same posture for 14 days. On the 2nd day, she started vomiting and would not retain even sips of water. This was treated in the usual way and it stopped. On the 5th day and from then onwards the convalescence was uneventful.

First dressing was done on the 7th day and the stitches and the conjunctiva, removed on the 10th. On the same day fundus was examined for the first time after the operation. The retina was back in place—vitreous was clear and the reaction of operation had largely subsided. Bandage was removed on the 14th day and replaced by pinhole spectacles.

Patient was first allowed out of bed on the 21st day after operation and was discharged from the Nursing Home on 25-3-51 with instructions that she should not go up and down the stairs for 3 months, to use pinhole spectacles all the waking hours and continue atropine drops for one more month.

I last saw the patient 4 months after the operation. Her vision had improved to 20 ft. with − 2·0 Dsph. and her field of vision had slightly enlarged. She had discarded her pinhole glasses and had stopped the use of atropine drops.

Discussion

As I have already said in the early paragraphs, a surgeon in a country like India should not always look for luxuries in his work but should devise means to develop his work in the simplest way.

What I did in this case was a modification of what Gonin did in 1929. In short I did *cautery punctures with surface diathermy*, in contrast to " Diathermy punctures with surface diathermy," the present day operation with a Pantostat.

Comments

The only disadvantage of my operation is that the current was not entirely under my control. The Hyfrecator was adjusted to a particular amperage but one was not absolutely certain that the same amperage alone would pass through as compared to a Pantostat where you can be exact up to even 1 milliampere. I had overcome this difficulty to some extent by repeatedly testing the apparatus before the operation.

The only other operation done these days for detachment of retina which does not need the costly equipment is resection of sclera. This operation is far more difficult and causes far more disturbance to the eye. Resection is, in fact, done only in cases where the other operations have failed and detachment is extensively extending all round the disc and macula.

Conclusion

A case of detatchment of the retina is reported which was operated on successfully.

The operation needs simpler equipment and is based on the same principle as the " diathermy puncture with surface diathermy " and gives equally good results.

MYOTONIA CONGENITA

AMAL CHAKRAVARTI, M.D. (CAL.),
Burdwan (West Bengal)

Myotonia congenita is a distinctly rare disease in India. Only one case appears to have been recorded so far (Amir Chand and Chuttani, 1945).

It has been considered to be a heredofamilial disease, Hypertrophy of the fibres with vacuolation characterizes its pathology. The real cause of the disease is not known. Upholders of neuropathic theory claim excessive liberation of acetyl-choline at myoneural endings or its increased concentration due to diminution of cholin-esterase, to be the chief cause, whereas abnormal muscular sensitivity to direct stimulation of the muscles with blockage of nerve impulse transmission speak of a myopathic basis of the malady. Clinically characterized by slow, weak, clumsy, tonic contractions of voluntary muscles on commencing work, and persistence of the tonic phase for a long time, even after the stoppage of the stimulus. A localised group of muscles may be affected or the manifestations may be generalized.

Case Report

Bholanath, aged 1 year, Hindu, male child, was brought to me by his parents on 14-4-51. The history was that the baby became stiff on crying, the stiffness involving the whole body; the facial expression and the attitude of rigidity taking a long time to settle. In throwing the legs, the limbs were found to make a slow and clumsy movement. Face turned to one side or limbs flexed, semiflexed, or extended were noticed to remain in that position for an abnormally long time and return to normalcy was delayed; further, rigidity started anywhere was found to be quickly generalized. During sleep the body was completely relaxed and soft.

The baby was the only child of his parents, born full-term, delivery normal, there was no history of maternal illness during pregnancy. History of rigidity in other members of the family was absent. Parents were not myotonic. On examination, the baby was found to be sparsely built, under-nourished and pale. Limbs were stiff, abdomen was rigid and movements of neck were not free. On crying, the whole body became stiff, a general attitude of flexion with slight extension of the head. Cranial nerves revealed no abnormality. Jerks were normal. There was no sphincter disturbance. Muscles not wasted. Calf muscles appeared hypertrophied. Stool, urine and blood picture was normal. The patient on quinine therapy showed some improvement.

Discussion

Diagnosis of myotonia was based on rigidity, its exacerbation on crying, failure of timely relaxation and absence of rigidity during sleep. Further, there was absence of C.N.S. involvement and of athetoid tremors. In myotonia atrophica, wasting of the muscles, testicular atrophy and cataract are characteristic features. In paramyotonia congenita, the myotonia occurs when the child is exposed to cold. In tetany (generalized), the attitude is characteristic.

Photograph of the Patient in a Phase of Tonic Contraction.

Conclusion

A case of myotonia congenita without evident heredofamilial disposition is cited.

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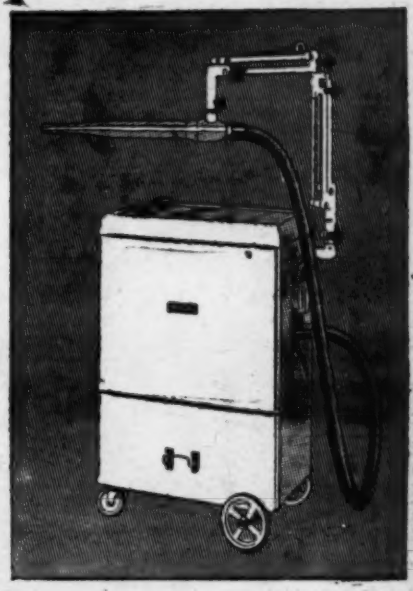

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INDIAN MEDICAL ASSOCIATION
CALCUTTA, APRIL, 1952

HEALTH PLANNING

The Planning Commission of the Government of India, with Hon'ble Sj. Nehru as its Chairman, has published its report on five-year planning for the future development of our country. It has very appropriately been stressed that a country's development depends on the extent of equipment provided to its people; better resources for a healthy living, definite reduction in the incidence of sickness, removal of disability and lowering of death rate, increasing expectation of life at various stages; so that the available human factor can be utilised maximally for qualitative as well as quantitative use of the land.

To assess the real state of affairs in our country regarding the above conditions, proper and dependable data are needed. Although available materials are hardly sufficient for the purpose of this assessment it cannot be denied that we are far behind other countries in matters of vital health necessary not only to fight out the ravages of diseases but to ensure positive health as a dependable reserve to meet any onslaught on our people's health. The average mortality rate though on the decline is still very high. So also are the figures of infant and maternal mortality. The loss of manpower ultimately impoverishes a nation as it vitally affects the economic development of the country. When we need economic regeneration so badly it is natural that our leaders should have given sufficient consideration to the question of physical disability in various stages. Thus in any health planning programme, the main objective should be the creation and maintenance of proper conditions for ensuring physical, mental and social environment for the individual as well as for the community so that healthy living can be assured. Provision of hygienic housing, adequate and nutritive food, fresh air, suitable working conditions of employees with reduced hazards to health, recreational facilities for better utilisation of leisure are some of the essential requirements to be fulfilled to achieve substantial improvement in the general well-being of the people.

It is agreed that every scheme for national development must include in its programme some measures for health planning which aim at the creation and maintenance of personal and community health services on a scale to meet the requirements of the people.

In our country the very low economic factor stands as an impediment to the ensuring of healthy living and provision of adequate protection for preservation of health of the average person. Lack of general and health education is also a factor responsible for the present state of ill health of our people.

Undernutrition and malnutrition no less contribute to the loss of vitality and lowering of resistance to various infectious diseases. The rapidly growing incidence of tuberculosis in our country has its root in undernourishment to a great extent.

The Health Survey and Development Committee during the last stage of World War II in its report covered a large field and proposed long and short-term programmes to reorganise the health services. Primary health centres at the periphery for preventive and curative work amongst the people with provision of higher type of medical service at Thana headquarters with still higher specialised services at the District headquarters were recommended. To adopt the scheme in its entirety would cost the Government an impossible huge sum of money—not now available. The Planning Commission has, therefore, suggested the readjustment and reorganisation and further expansion of the existing facilities to conform to the main objectives of the Health Survey Committee.

As a large incidence of sickness affects production of food and other productive occupations and naturally impedes production, the Commission has stressed that during the next five years additional resources should be concentrated more on preventive work. Rural areas should receive special treatment for intensive work.

As the incidence of malaria is very high and as it incapacitates people slowly and also takes away at least a million persons every year and causes tremendous economic loss, it must be tackled with the modern means of prevention by controlling mosquitoes by spraying D.D.T. or other insecticides. Such anti-malarial measures have proved successful in selected areas of our country and it has brought down the sickness rate considerably. State Governments are roughly spending a crore and a half of rupees on the measures aided by international organisations in some cases.

Tuberculosis takes away 5,00,000 lives every year and about 5 million people are suffering still from the ravages of this fell disease. More clinics and sanatoria are needed to cope with the rapid increase of the disease. The B.C.G. vaccination programme started in this country should be extended to have its effect in course of the next few years.

Maternity and child welfare work should be improved and pre- and post-natal clinics should form an integral part of these schemes and more maternity beds should be provided.

The present untrained *dais* and midwives in the rural areas should either be trained or replaced by trained personnel.

To impart health education amongst people, all public and private bodies should be encouraged to undertake the task of propagating health consciousness amongst the people. Health education must be taken up as an integral part of health activity.

Subjects like physical education, training and research, supply of drugs and equipment for their manufacture, and the co-ordination, if possible, of the different systems of medicine now in vogue in our country, compilation of dependable vital statistics and, last but not the least, introduction of family planning have been rightly stressed by the Planning Commission.

For the implementation of the entire five-year plan programme, formation of State and district committees consisting of officials and non-official members have been recommended.

We feel that in every state, a development and planning ministry should be set up, as also co-ordinating committees with representatives of different departments, to give these schemes due thought and to carry out the same to benefit the masses.

The report was published on the eve of the general elections which are just over. Let us hope the new central and state governments would concentrate their attention on the report and proceed to implement the recommendations forthwith so that a better picture of the country could be presented after the next five years.

In this context we commend the scheme to the profession, the members of which must also fall into line with the rest in India and do their part in the future shaping of our country to better equip its people to fight out the various menaces to health. Let us hope and pray that the joint labours of the official and non-official agencies will ultimately benefit the common man and a brighter picture in matters of health of our country would be seen in the next few years' time.

We learn that our Association is considering the plan and would soon submit its report to the Government.

We have by now enough materials regarding the existing state of health of our people and also the needs to cope with the same are well-known to those members of the profession who have served the people in various emergencies during the last several years. The data however insufficient and defective they may be, can be accepted and schemes laid out to root out the present condition of ill health. Let us hope this report for health planning will not meet almost the same fate as that of the Health Survey and Development Committee's recommendations and something tangible and spectacular will evolve out of the labours of the leaders of our country who have just been saddled to office with tremendous responsibilities for the people who have returned them to the Parliament and the State Legislatures.

WORLD HEALTH DAY

The World Health Organisation has fixed seventh of April as the day for observance of World Health Day all over the world with a slogan " Healthy Surroundings make Healthy People."

It is an accepted truth that environmental sanitation is an effective prevention against a host of diseases and that is why on this particular date this year, as in the past, further propaganda on this aspect amongst the people of the world has been suggested.

It does not require much intelligence to realise that human health deteriorates due to unhealthy physical conditions of life. The fundamental elements in man's surroundings *e.g.*, air, water and soil play an important role in matters of health and sanitation. Thus particular attention needs to be forcussed on these elements to protect them from contamination. Besides these elements, some other environmental factors such as poor housing, unprotected foods, accumulation of wastes in the surroundings, congested and overcrowded living, increase human sufferings by causing diseases many of which often lead to death.

Man's life is a continuous fight against germs and viruses of diseases and the effective protection to a large extent lies in the maintenance of healthy surroundings. If the conditions of our physical environment are unsatisfactory, the progress of medical science will be of no avail in arresting the tragic waste of human life.

So a practical application, on a wide scale, of this year's slogan is absolutely justified to save mankind from the many ills it suffers. Let Government agencies, members of the profession and the general public everywhere, with co-ordinated efforts create a healthy condition of life by a successful control of the unclean physical features of human environments.

It is a simple and easy task that the people of the world have been called upon to perform in course of this year. Besides, it is a well-known fact that germs grow and prosper generally in filth and dirt, either in the air or water or the soil and their tendency is to seek companionship in persons with unclean habits and living in unclean environments. Cleanliness is a virtue which needs to be cultivated by every person throughout the world.

It does not require much expense nor strenuous efforts to get rid of filthy surroundings. Only this consciousness is enough that to prevent illness, a state of healthy surroundings is an absolute necessity.

It is the general habit of the people to look to outside agencies for improvement in their health conditions. Only if they look to their own duties in this respect, much of this problem disappears.

CURRENT MEDICAL LITERATURE

Inter-relationship Between Cardiovascular Function and Gastrointestinal Disease

Suckle and Warton (*Am. J. Digest. Dis.*, **18**: 261, 1951) write that the simulation of cardiovascular disease by gastrointestinal disease and *vice versa* presents problems in correct diagnosis and adequate treatment.

The displacement into the chest of symptoms originating in a diseased abdominal organ naturally focuses interest on the heart. This is particularly true when symptoms such as substernal distress, radiation of pain into the arms, and dyspnœa occur. It is the failure to recognize that the cardiovascular system may respond reflexly to extracardiac influences that the clinician is led into error. Another source of confusion is afforded by the history which is taken entirely along the line of gastrointestinal dysfunction, whereas the prominence of abdominal symptoms in sudden right heart failure might lead to an erroneous implication of the liver, or other organs, as the seat of disease in a true congestive failure.

The necessity for thorough investigation of both cardiovascular system and gastro-intestinal function is required when history is not typical and abdominal symptoms are present. Abnormal electrocardiograms alone or changes in the x-rays of the gastro-intestinal system do not suffice to implicate one system as totally responsible for the patient's symptoms. Unless a multilateral history is developed and then integrated with physical and laboratory findings, the result can be an erroneous emphasis on the organ acting reflexly.

Drugs which are commonly supposed to be specific in their effect on the cardiovascular system—such as amyl nitrite, aminophylline and papaverine—actually have a similar action on the smooth muscle of the gastrointestinal system. The initial therapeutic response is, therefore misleading in some cases.

Proper therapeutic management of the diseased gall-bladder, the colon made irritable by diverticulitis, or the stomach made hyperperistaltic by an active peptic ulcer serves to decrease the reflex vagotonia. Thus the cardiovascular system is spared a load which it can ill afford when it is already damaged.

There are four ways in which the abdominal organs may adversely influence the cardiovascular system. First, sudden increases in reflex vagotonia with consequent embarrassment of a cardiac coronary circulation not equal to sudden stresses. The occurrence of these instances in older patients is in keeping with the concept of vagotonia increasing with age. Secondly, abdominal distention if marked or acute dilatation of the stomach or a large diaphragmatic hernia serve to diminish the vital capacity of the pulmonary system and may also interfere with the normal unrestricted motion of the heart. Third, the effect of electrolyte change such as occur in intestinal obstruction, removal of ascitic fluid, pancreatitis are reflected in alternations in the electrocardiogram. Finally, shock-producing states such as severe hæmorrhage from a peptic ulcer or shock from a fulminating peritonitis can markedly depress cardiac function.

Advances in Medicine

Cohen (*Practitioner*, **167**: 330, 1951) deals with the subject under the following heads: sulphonamides, penicillin, streptomycin, chloramphenicol, aureomycin and terramycin, antibiotics in prophylaxis, chemotherapy of tuberculosis, haluronidase, cortisone and ACTH, antihistamines, alcoholism and abuse of bed rest:

The sulphonamides—Sulphadiazine and sulphamerazine remain the most effective agents in meningococcal infections, Shigella dysentery, and certain urinary tract infections. In all other infections the appropriate antibiotic seems to be superior to the sulphonamides. These are, however, still widely used, for they are therapeutically effective, easy to administer, and inexpensive. But their toxic effects are troublesome, and the possibility has been suggested that they may play a part in the alleged increased incidence of collagen disease. Therefore, unless there are clear indications for their use, either in prophylaxis or treatment, they should be withheld.

Penicillin—Procaine penicillin with aluminium stearate is more effective than procaine penicillin in oil or water, or penicillin in oil and wax. Penicillin has found few more effective uses than in the treatment of acute bacterial pneumonias, yet in chronic respiratory infections, such as chronic bronchitis, bronchiectasis, and chronic lung abscess, even when these are associated with organisms of proved penicillin sensitivity, the benefit from systemic penicillin is but slight.

Among penicillin's most spectacular conquests is subacute bacterial endocarditis, which in earlier days had been an almost invariably fatal malady. Now 60 to 70 per cent of its victims survive. Penicillin is still the antibiotic of choice in subacute bacterial endocarditis due to *Streptococcus viridans* or *faecalis*, although if these larger doses of penicillin, or the combination of penicillin and streptomycin, prove ineffective, aureomycin or chloramphenicol should be tried if *in vitro* studies show that the infecting organism is sensitive.

Streptomycin—Because of its toxicity and the rapid development of resistant strains of organisms, streptomycin is being supplanted in most infections by the newer antibiotics. It still remains, however, the antibiotic of choice in tuberculosis and, alone or in combination, in urinary tract infections due to *Pseudomonas aeruginosa and B. proteus*, and in enterococcal endocarditis. *Neomycin*, isolated by Waksman and his associates from *Streptomyces fradiæ*, is potent in infections caused by salmonella, pseudomonas, escherichia, aerobacter, klebsiella, and proteus; and in extrapulmonary tuberculosis. In pulmonary tuberculosis and brucellosis its effects were not encouraging. Its toxic actions, similar to those of streptomycin, on the vestibular apparatus and on the kidneys, and the production of resistant strains during treatment have been noted. *Viomycin*, obtained from *Streptomyces punicus* and *Streptomyces floridæ*, is effective primarily against acid-fast bacteria, including strains of tubercle bacilli which are resistant to streptomycin, neomycin and para-aminosalicylic acid (PAS).

Chloramphenicol, Aureomycin and Terramycin—These three antibiotics have many common features and with few exceptions are equally effective in the treatment of susceptible infections. Their outstanding characteristics are: (i) low toxicity, (ii) effective control of a broad spectrum of infective agents, and (iii) adequate absorption from the digestive tract, so that they can be given by mouth. The total daily oral dose for all three antibiotics is 2 to 4 gm., in equally divided doses, every four to six hours. In contrast to penicillin their action is bacteriostatic rather than bactericidal.

The infections in which these three antibiotics play a special part in contrast to penicillin are: the typhoid group; most coliform infections of the urinary tract except those due to *B. proteus* or *Ps. aeruginosa;* brucellosis of all types (though relapses are common); and most rickettsial infections, including typhus, Q fever and spotted fever. Susceptible virus infections are primary atypical pneumonia, psittacosis, lymphogranuloma inguinale; and possibly chancroid, herpes zoster and disseminated vaccinia. Among protozoal infections, amœbic dysentery often shows dramatic cure with aureomycin. Bacterial penumonias which respond include streptococcal, pneumococcal, staphylococcal, influenzal, Friedlander's and tularæmic pneumonias. Cutaneous anthrax has responded well. Viral forms of grastro-enteritis seem unaffected and the response to salmonella infections is variable. Despite early enthusiastic reports there is increasing doubt of the effectiveness of these antibiotics in the treatment of whooping cough, and attention should be called once again to their ineffectiveness in such common infections as the common cold, viral influenzas, poliomyelitis, infective mononucleosis, fungoid infections, and rheumatic fever.

The untoward effects of treatment with these antibiotics are singularly few. Gastro-intestinal disturbances with anorexia, nausea, vomiting and epigastric pain may occur. Monilial infections of the mouth with atrophic glossitis and 'black hairy tongue' may follow the destruction by antibiotics of the bacterial flora of the mouth which results in uninhibited fungal overgrowth, and the oft-described rectal and vulval irritation and burning are probably of similar origin.

It has earlier been noted in discussing the treatment of subacute bacterial endocarditis that a combination of antibiotics has often proved most effective. This is true also of brucellosis; of certain staphylococcal infections in which both penicillin and aureomycin may be necessary; and in infections for which enterococci or gram-negative bacilli are responsible, there may be need for streptomycin and chloramphenicol. There is some experimental evidence that combined therapy may result in mutual interference, but no impaired activity due to this cause has been observed in man.

Antibiotics in Prophylaxis—The role of antibiotics in the prevention of disease is increasing. Dental extractions, tonsillectomies and other surgical operations, and parturition in complicated deliveries, are examples of procedures in which penicillin 'umbrellas' have greatly decreased morbidity and mortality, especially in the susceptible. The prophylactic value of penicillin in syphilis and gonorrhœa, and of chloramphenicol in scrub typhus, has been emphasized in recent reports, and there is suggestive evidence that not only is penicillin of value in preventing recurring attacks of rheumatic fever in known rheumatic subjects, but that rheumatic fever may be prevented by early and intensive therapy with penicillin after the onset of a streptococcal sore throat. These observations need confirmation.

Two points in prophylaxis are worth notice. First, that that there is no need to give a penicillin 'umbrella' for several days before operation. It suffices to give penicillin a few hours before, so as to ensure the maximum concentration in the blood during the operation, and for forty-eight hours after operation, which adequately covers the possible systemic dissemination of organisms from the infected site. Secondly, prophylactic doses of penicillin must be adequate. There is a real danger from the multiplication of resistant strains.

The Chemotherapy of Tuberculosis—Streptomycin still remains the most effective agent, with para-aminosalicylic acid (PAS) a most valuable adjunct. This combination permits of streptomycin treatment being given to patients previously considered unsuitable. By delaying the emergence of streptomycin-resistant variants of tubercle bacilli it enables the period of effective streptomycin therapy to be prolonged; and by reducing the necessary dosage of streptomycin it limits the toxic hazards of its prolonged use. In combined therapy the effective initial dose of PAS was 12 gm. daily for adults, with a dose of streptomycin of 1 gm. every three or four days. Much work has also been carried out on the thiosemicarbazones, especially thiacetazone. It can be given by mouth or parenterally in doses of 25 to 50 mgm. daily for the first week or two, with a gradual increase to 200 to 300 mgm. daily if the patient can tolerate it, and treatment can be continued for six to twelve months. It is said to give its best results in active early lesions of the lungs and in laryngeal and intestinal tuberculosis, but in general infections it is acknowledged to be far less effective than streptomycin. Moreover, toxic symptoms are common: gastro-intestinal upsets, headache, photophobia, skin reactions, granulocytopenia, purpura and hepatic necrosis have all been recorded. It is doubtful if thiacetazone will find a permanent place in the treatment of tuberculosis.

Hyaluronidase—Hyaluronidase, an enzyme which acts on connective tissue, rendering it more permeable, is used as an aid to the parenteral administration of fluid to infants and children. Since the difficulties of the intravenous route at an early age are often insurmountable, this method offered a useful alternative. The conditions in which hyaluronidase has proved of special value are severe dehydration fever in the newborn, pyloric stenosis, and gastro-enteritis.

Cortisone and ACTH—Among the systemic diseases which a year ago were regarded as responding favourably to cortisone were rheumatic fever, rheumatoid arthritis, psoriasis, disseminated lupus erythematosus, polyarteritis nodosa, asthma, and urticaria. Further studies have shown that except for rheumatic fever and rheumatoid arthritis (*i*) the response in the others occurs in only a proportion of patients; (*ii*) remissions thus induced are often of short duration and may be symptomatic only, *e.g.*, in acute leukæmia, in which despite improvement in the general condition and in the blood picture the marrow may remain unaltered; (*iii*) relapses are often resistant to further treatment; and (*iv*) complications may follow treatment, *e.g.*, perforation in ulcerative colitis and in peptic ulcer, and dissemination of tuberculosis. There is increasing support for the oft-quoted opinion that, 'ACTH and cortisone do not cure anything,' although it seems premature to regard them simply as 'glorified aspirin.' Toxic effects include a tendency to Cushing's syndrome with hypertension; glycosuria and occasionally mild diabetes mellitus; a negative nitrogen balance; hypertrichosis; acne; œdema due to sodium retention which can precipitate cardiac failure; menstrual disturbances; osteoporosis with spontaneous fractures; psychotic disturbances, usually of elation and euphoria, but occasionally of severe depression; frequent electro-encephalographic changes; and the inhibition of the natural processes of healing in ulcers and wounds. Thus, as experience grows, the limitations, difficulties, and dangers of ACTH and cortisone therapy in chronic disease are becoming increasingly evident, although of their value in certain types of acute and subacute arthritis and iritis, and as a research tool, there can be no doubt.

The Antihistamines—Several carefully controlled investigations have shown beyond any doubt that, whatever be the antihistamine drug used, the treated are no better off than the controls in the incidence, severity of symptoms, or duration of colds. When properly prescribed under medical supervision for allergic states, Parkinsonism, Meniere's syndrome and sea-sickness, toxic effects are infrequent, but there is increasing evidence of the dangers of self-medication which appear to be too little known. Several fatal cases have been recorded especially in children in whom there is a predisposition to convulsion. Psychotic changes are common, and agranulocytosis has been observed with an occasional death.

Smoking and Cancer of the Bronchi and Lungs—Among the factors held to play a part, largely on the theoretical basis that irritants are carcinogenic, have been (i) the increasing atmospheric pollution from petrol fumes and motor car exhausts, from gas works and tarred roads, and from the smoke of coal fires and industrial plants; and (ii) from tobacco smoking. The nature of the carcinogenic agent is left open. There is no evidence that potent carcinogens, *e.g.*, benzpyrene, are formed in the combustion of tobacco, nor that insecticides containing arsenic and used in spraying the tobacco plants provide an explanation of the association of tobacco smoking and cancer of the lung. Petrol lighters and cigarette paper have been indicated by some without adequate evidence. It is clear that the full elucidation of the problem will need much more research—clinical, statistical and experimental. In the meantime, economic factors rather than its potential carcinogenicity are likely to result in the diminished use of tobacco.

Alcoholism—The suggestion has been made that in alcoholism, deficiency of the adrenal cortex may be constitutional or the result of the prolonged and excessive intake. In either event the administration of adrenal cortical extract (ACE) might be expected to benefit the victim. Both ACE and ACTH are effective in the treatment of acute alcoholic intoxication; in delirium tremens ACTH is the most dramatic treatment yet known; ACE is effective in Korsakoff's psychosis, whilst ACTH is not. In the chronic alcoholic the effects are not so satisfactory.

Abuse of Bed Rest—The disadvantages of recumbency—the poor circulation to the lung bases, the increased predisposition to thrombophlebitis and resulting embolism, the abnormal nitrogen and calcium metabolism, and particularly the economic factors and psychogenic sequelæ—are all adduced by Irvin and Burgess as evidence that routine prolonged bed rest is not only unnecessary, but potentially harmful to the mental and physical well-being of patients. Although they recognize the need for individualization in therapy, and that in patients with extensive infarction modifications will be necessary, they advise that for the majority of patients a rest of two weeks in bed, and bedside toilet privileges, suffice. If all is then well patients should be gradually allowed to walk longer distances, until at the end of four weeks from the onset they have regained some of their previous exercise tolerance and are prepared to leave hospital on light activity.

These recommendations are essentially opinions.

Types of Human Diabetics

Lawrence (*Brit. M. J.*, **1**: 373, 1951) writes that the term "diabetes mellitus" includes a variety of glycosuric conditions separate both in clinical type and in etiology. Lawrence emphasizes that there is the fat diabetic (lipoplethoric) who probably has no deficiency in insulin and whose glycosuria can be controlled by loss of weight. These patients do not develop ketosis or coma. Then there is the usual diabetic who certainly is insulin-deficient and who, in the absence of insulin treatment, is prone to develop ketosis rapidly. He describes a third and very rare type of diabetic who lacks the ability to deposit fat anywhere in the body and who is insulin resistant. He uses the term "lipoatrophic" to designate this rare type. Studies with labelled glucose in tracer experiments indicate that insulin turns glucose into glycogen, but almost equally rapidly, into stored fat. Acting on a large meal, insulin is quantitatively more lipogenic than glycogenic.

Uses and Abuses of Antihistamine Drugs

Sherman (*Bull. N. Y. Acad. Med.*, **27**: 309, 1951) writes that the available antihistaminic drugs are all essentially similar in their action and side effects although varying both in potency and toxicity. No one drug may be said to be the best. These drugs are of value for symptomatic relief in allergic rhinitis, urticaria and serum sickness and for the control of itching. In no disease do they have a curative effect. In asthma, their efficacy is less than that of older drugs. In the treatment of the common colds they do not alter the course of the infection but may afford some symptomatic relief. The commoner side effects are drowsiness and nausea. With gross overdose, the usual mental effect is confusion and excitement rather than somnolence and in severe cases this may result in acute toxic psychosis. In idiopathic epilepsy and seizures due to focal lesions of the cerebral cortex, Benadryl and Pyribenzamine have been shown to increase the frequency of seizures. In the absence of specific data on the other drugs of the group, it is apparent that all antihistaminics should be used with caution, if at all, in patients with convulsive seizures. Long continued use occasionally leads to leukopenia or agranulocytosis. Contact dermatitis not infrequently results from their topical use. On the whole, these drugs represent a definite contribution to therapy but there is still room for newer compounds with greater potency and less toxic effects. In most of the allergic diseases, their efficacy is surpassed by that of cortisone and ACTH.

Oral Procaine and Ascorbic Acid in Pruritus

Luddecke (*Arch. Dermat. and Syph.*, **64**: 9, 1951) reports on the satisfactory results obtained with the oral use of procaine hydrochloride and ascorbic acid in cases of pruritus of allergic origin. Details are given of ten cases treated in this way: atopic dermatitis (2) penicillin reactions (2), tetanus antitoxin reaction, dermatitis (2), food urticaria, contact dermatitis, urticaria. All responded satisfactorily and rapidly, except one case of atopic dermatitis in which there was an exacerbation of symptoms after the fourth dose of the procaine-ascorbic acid combination. In many of the cases there had been no response to antihistamines given before the procaine ascorbic acid combination. The procaine and ascorbic acid were given in the form of tablets, each containing 250 mgm. of procaine hydrochloride and 150 mgm. of ascorbic acid. The usual dosage was one or two of these tablets four times daily. Reference is made to the low toxicity of procaine when given orally.

Essentials of the Treatment of Diabetic Acidosis

Goldner (*Am. J. Digest Dis.*, **18**: 235, 1951) writes that diabetic acidosis and coma develop through the steps of

dehydration and starvation; its severity is proportional to the degree of fluid and electrolyte imbalance. Diabetic acidosis and coma are not precipitated by hyperglycæmia itself, but only by that type of hyperglycæmia which is due to critical insulin deficiency.

Critical insulin deficiency may be caused by various mechanisms; these constitute a vicious cycle leading to coma and acidosis.

The need for large doses of insulin, for fluid replacement and judicious use of glucose in coma treatment is emphasized. The author gives in the table below what is essential and not essential in treatment of diabetic coma.

The Essentials of the Treatment of Diabetic Acidosis

When	*Why*	*What*	*How*	*Beware*
		Essential		
Insulin	To start glycogenesis to stop ketogenesis to stop diuresis	Immediately	100 U Reg. or Crystalline insulin double previous dose every hour until response	Hypoglycæmia Hypopotassæmia.
Isotonic Saline solution	To replace fluids, to replace Na, Cl	Immediately	Intravenously, 2-3,000 c.c. 120 drops 1 min.	Renal function overhydration.
Plasma	To combat shock, to replace fluid and electrolytes	If pt. does not respond to saline	Intravenously 600 c.c.	Hepatitis (late).
Glucose	To supply energy, to prevent insulin hypoglycæmia	As soon as glycosuria decreases	Intravenously 5 per cent in saline	Increase of glycosuria increase of water and electrolyte loss.
		Not essential		
Bicarbonate	To combat acidosis (to accelerate the function of insulin)	When above measures are ineffectual	Intravenously, 500 c.c. 4% sod. bicrab., Ringer's solution, Hartmann's	Alkalosis if renal function impaired.
Potassium	To replace loss	Late, not before blood sugar has started to drop	Best, by mouth (orange juice)	Hyperpotassæmia in renal impairment
Multi-electrolyte solutions	To provide optimal fluid and electrolyte replacement in the presence of renal impairment.	To follow saline when renal impairment	Darrow's, Butler's solution intravenously	Overdosage of electrolytes.

CURRENT TOPIC

INDUSTRIAL NOISE AS A HEALTH PROBLEM*

Messrs H. C. Ganguli and M. N. Rao of the Industrial Health Research Unit I.C.M.R. and Section of Physiological Industrial Hygiene, All-India Institute of Hygiene and Public Health, Calcutta, write as follows:

Introduction

That high factory noise has harmful effects on the worker's health and may also be a handicap for his working efficiency has come to be generally recognised now. The term noise, in this context, connotes, not only disturbing sounds consisting of non-periodic air vibrations but also certain musical sounds which, under particular circumstances, may be a distracting factor for the worker at his work. Of this second type are the noises in industries where sonorous metals are beaten, as in the manufacture of copper boilers or copper ware articles. Just now, however, the tendency is to widen the scope of the problem still further and include within it the hazards not only of sounds but also of ultrasounds. The essence of the problem is the disturbing and harmful aspect of the sound factor and thus noise is any sound (or ultrasound) which is disturbing and/or harmful for the worker and be better eliminated.

Measurement of Noise

The instrument for measuring intensity of noises is called the sound level meter or the noise meter and "is essentially a device for measuring the amplitude of rapid alterations in the air pressure" (Scott, 1943). It measures sound intensities by "translating the acoustical oscillations into elec-

* Industrial Health in India Series No. XXII.

trical oscillations and then amplifying them by high quality vaccum tubes" (McCord *et al.*, 1938). These measurements are recorded along a logarithmic scale, the unit of which is a 'bel.' But measurements of sound intensities are expressed in 'decibels' (1/10th of a bel) which is a more convenient unit. Since the decibel is a logarithmic unit, corresponding to the physiological standard, sound levels expressed in decibels cannot be added together. A logarithmic table or better, a decibel table is necessary for the summation of two sound levels expressed in decibels.

The sound level meter measures only the amplitude of the sound waves. A complete description of a sound however needs, in addition, measurements of its pitch and quality. For a complete knowledge of the make-up of a sound, therefore, the use of the sound level meter should be supplemented by that of a sound analyzer. "A sound analyzer measures the amplitude of each individual frequency component. For steady-state sounds, therefore, measurement of level with the sound level meter and analysis of harmonic structure with the sound analyzer gives a substantially complete description of the sound itself." (Scott, 1943).

Some Typical Sound Sources

Below is given a scale of sound levels for some typical sound sources. Incidentally, it may be mentioned here that discrepancies are often found in noise level readings of the same operations with the same equipment but by different authors. This is most probably due to their not following one standard procedure in making these surveys. Those interested in surveying factory noises may profitably follow the procedure laid down by McCoy (1944).

Table 1—Showing Average Noise Intensities from Some Typical Noise Sources

Noise Sources	*Noise Level (in decibel)*	
Threshold of hearing ...	15	
Average office	50	Noise above this likely to attract and control attention.
Conversation	60	
Quiet typewriter	65	
Lathes	80	
Pneumatic drill (10 feet) ...	90	
Loom	94-101	Sound above this likely to damage hearing and effect efficiency at work.
Wood-planers	95- 99	
Automobile rivetters ...	98-110	
Drop hammers	99-101	
Wood saw	100	
Rivetter, Boiler factory ...	105	
Punch press	110	
Airplane motor (20 ft.) ...	125	
Pneumatic rock drill ...	130	Threshold of painful sound.
Turbo-jet aircraft engine (sound varies with engine speed) ...	130	
Airplane motor test chamber ...	140	

We have not come across any study wherein a systematic measurement of noise in Indian industries is given. Below is given the results of a noise level survey done by us in the different sections of two Calcutta engineering factories. The survey was done with the noise level meter manufactured by the General Radio of Massachusettes, U.S.A., Model No. 759. The object was not an analysis of the various noises from the engineering point of view, but to determine if in any section of these two factories the noise level is high enough to cause injuries to the workers. Consequently, the noise was measured at the ear-height of the workers.

Table 2—Showing Noise Levels in Two Calcutta Engineering Factories

Factory A		*Factory B*	
Sections	*Noise level (in decibels)*	*Sections*	*Noise level (in decibels)*
Pneumatic Moulding machine room (3 machines) ...	135	Lathes section ...	76
		Press and Capstans-machine room ...	73
Overhead crane (Operator's ear) ...	95-115	Punch presses section	82
Mechanical saw ...	118	Mechanical saw and mechanical plaining	82
High Speed steel furnace & blowers ...	84	Nickel plating shop ...	84
Machine shop ...	85	Machine shop ...	80
Tool shop ...	79	Foundry	86
Spindle Assembly ...	78	Grinding	77

Table 2 gives the various noise levels in the different sections of these factories. Not in every case the noise reaching the workers was produced by machinery of the particular sections only. Often it was found that two or three sections are housed in the same shed so that there was a continuous overlapping of noises from different sections. If we regard a noise of 100 decibel level to be the maximum safety limit, it will be seen that only the first three sections of factory A are harmful to the workers concerned. This is specially true in the case of workers working the pneumatic moulding machines and the mechanical saw. The sound from the pneumatic machines were stucatto and machine-gun like, and is particularly harmful to the auditory apparatus. The noise from the mechanical saw was of a peculiarly rasping nature which, apart from its intensity, is highly disagreeable specially to workers of a rather nervous temperament.

Noisy Trades

"Noise in industry is due to the running of machinery and to actions effected by machines; to vibration and din caused by parts of machines that are not well equilibrated; to transmission gear, such as defective driving belts or bad running; to such tools as hammers and saws; and to the manipulation and transport of material." (Carozzi—1934). Unfortunately, however, authorities are not whole-heartedly agreed as to how much noise should be present inside the factory shed to justify classifying that industry as a noisy industry. Nevertheless, the following trades, as suggested by Carozzi, may be classified as noisy trades: metal work industries, more particularly copper works, sheet iron mills, tinplate works, nail factories, boiler works and ship-building yards (the chief noisy operations in these being smelting and

casting, mechanical stamping by steam hammers, rolling, beating and drawing of metals and especially rivetting); textile industries, especially the processes of weaving and spinning; felt industry; transport industry, especially railways; and the building trade, especially tunnel construction, breaking down of walls by pneumatic picks, etc. Other industries in which the noise hazard is also present are cement industry, wood industry, flour mills, India rubber goods industry, telephone and telegraph works and gunpowder and armaments industry.

Effects of Exposure to High Noise

Noises act on the system by two ways—(1) by vibrations that are transmitted by air and (2) by vibrations transmitted by the body and the skeleton. Intense and most injurious noises are usually transmitted by air, as clinical observations and experiments show. But bone transmitted vibrations assume importance when noise is simultaneously transmitted by air and *via* the body. The relative importance of these two kinds of transmission varies from case to case. In the case of blacksmiths, for example, deafness is due mostly to noise but it may have been reinforced by vibrations through the skeleton. On the other hand, in the case of tram car drivers, for example, the main danger is from the long hours of exposure to bone conducted vibrations. The main protection against this type of bone conducted vibrations lies in isolating the vibrations, for example, by the worker's wearing, say, boots with soft soles, or by placing the source, *i.e.*, the machine, on vibration-absorbing cushions, etc. Below it is proposed to deal more elaborately with the problem of noises as transmitted through air, since this is obviously the more important of the two.

The effects of exposure to high noise in factories may be dealt with under two headings—(*a*) its effects on the workers' health and (*b*) effects on their working efficiency.

(*a*) *Effects of noise on the workers' health*: Injuries to the workers due to exposure to excessive noise are of two kinds—physical and psychological.

(*i*) Physical effects—Amongst the physical injuries caused by long exposure to loud noise, the most important, because found most often, is the worker's impairment of hearing. Such auditory affections are mostly "due to a chronic degenerative neuritis of the cochlea." The seriousness of the lesion is proportionate to the intensity of noise, to the length of the exposure and to some extent to the age and sex of the worker. The diminution of hearing may affect both the ears, but oftener only the ear usually most exposed to noise. For a long time, it is only the hearing of such high pitched tones as is present in the actual noise that is affected. But ultimately hearing for other sounds are also definitely affected.

Sufficiently numerous data are available relating to occupational deafness. McCord *et al.* (1938) give the following examples: W. G. Thompson found that 45 per cent of locomotive crewmen have impaired hearing. The incidence of deafness was found to be as high as 52 per cent among train despatchers who use the telephone constantly and this occurs largely in the telephone ear, the left. Gottstein and Kaiser examined 75 blacksmiths and found that 39 per cent of them had good hearing and 40 per cent were definitely hard of hearing. Barr found that out of 100 boiler-makers with an average of 17½ years of employment, only 9 had normal hearing. In a study among engine drivers, it was found that deafness increased from 11·7 per cent to 62 per cent with age and from 18 per cent to 75 per cent with length of service. Out of 1011 cotton weavers examined by McKelvie, 246 workers (24·3 per cent) showed varying degrees of deafness. The New York State Department of Labour 1930 reports that out of 1040 workers from noisy industries, the highest percentage of hearing impairment for any age group was from the noisiest industries, that is, in industries with noise level between 60 and 80 decibels.

Irregular and sudden noises of high intensity like that in drop forge operations or explosions as in mining or blasting operations may cause rupture of the tympanic membrane. Such sudden noises (of 80 or 90 dbs. or more) cause physiological reactions similar to those accompanied by the emotion of fear. Experiments show that unexpected and unfamiliar noise introduced during mental work may increase metabolic rate, heart beat and breathing rate. There may be a decrease of stomach contractions (by as much as 37 per cent) and in some extreme cases, it may stop altogether for some time (Horder, 1938). Sharp and loud reports also produce irregular disturbances in the intercranial pressure and raises it to about 4 times the normal amount (Kennedy as reported by McCord *et al.*). But usually these changes are transitory and pass away quickly.

(*ii*)—Psychological effects.—The psychological effects of noise have not been investigated in any detail. Consequently, little is known about them. That noise is irritating, at least in the beginning, all investigators agree. An interesting case refers to a complaint made by a Hospital to the All-India Institute of Hygiene and Public Health, Calcutta, against the operation of a pneumatic hammer in a nearby factory. On investigation, however, it was found that the intensity of noise reaching the hospital was very low but that the resulting irritation was unduly large. Many experts also believe that when a work is being done under noisy condition, a more intense mental application is required to concentrate attention on it. Eventually, this may give rise to nervous or mental fatigue, or what McKenzie (1934) calls "functional weakness or disability." In the production of these effects, apart from the various characteristics of noise itself, the mental, emotional and physical condition of the worker and the nature of the work he is doing are very important. If he is tired, run down, bored, maladjusted or uninterested in his work for any reason, he would find the noise more irritating than otherwise. It is held by many that a long exposure to noise in such a condition may well make the worker neurasthenic or psycho-asthenic.

Pollock and Bartlett (1932) are not inclined to support the above conclusion, basing their opposition on the mode in which they think adaptation to noise is produced and maintained. Mental fatigue, they argue, occurs only when conflicting mental processes are simultaneously stimulated, and in adaptation there is no such conflict. In adaptation the total effect of noise is in some way definitely altered and not suppressed through the activities of some inhibitory impulses. They conclude: "It would follow from this that a great many of the apparent ill effects of noise are probably due to social causes." However they admit that exposure to persistent and excessive noise of people hypersensitive to sound may be one of the conditions of psychoneurotic disturbances.

The above argument is based on a certain theory as to how adaptation takes place and is continued. Even now authorities do not agree as to this process of adaptation and

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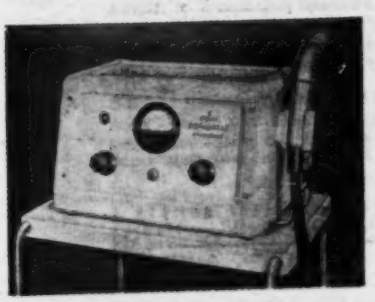

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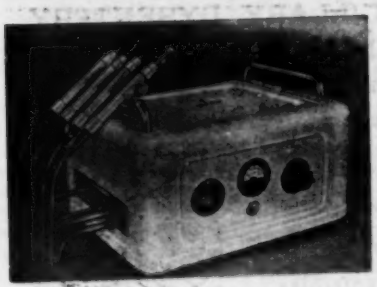

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consequently much cannot be said of the psychological effects of exposure to noise on the worker.

Recently studies are also being made on the effects of sounds of ultrasonic frequencies on men and animals. Dickson and Chadwick (1950) report of an investigation they made at the RAF Acoustics Laboratory into the complaints of occasional occurrence of unsteadiness, dizziness, and lack of concentration in personnel working with turbo-jet aircraft. They found the symptoms to be transitory and mild with no permanent ill effects. These transitory effects, however, they think "are largely due to high intensities and not to high frequencies as such."

They also give some other examples of effects of exposure to ultrasonic sounds. A chemist, "working daily with a 500,000 cycles per second source of ultrasound lost his sense of balance, manifested by his not being able to ride a bicycle." He however recovered on his removal from the ultrasonic source. A study made by Allen, Fringe and Rudnick showed that heating brought about by absorption of sound of a frequency of 20,000 cycles per second and of an intensity of 160 to 165 dbs. caused death of both mice and insects.

(*b*) *Effect of noise on the worker's efficiency in non-auditory performance*: "There appears to be a widespread opinion that noise directly diminishes efficiency, leads to increased liability to accidents and provides a persistently favourable background for the development of nervous and mental disorders of many kinds. For all these opinions there is very little evidence, beyond the fact that noise tends to be disliked, particularly by people who are not very much accustomed to it." (Pollock and Bartlett, 1932). This is perhaps the only opinion that can be given from the few well-controlled experiments that have been carried out on this problem both in laboratories and factories.

Weston and Adams (1932) made a study in U.K., of the effects of noise on industrial efficiency with ten cotton textile weavers of normal auditory acuity as subjects. Reduction of noise was effected by means of ear-defenders used by these operatives; these defenders cut down the 96 decibels of shed noise reaching the ears to about 87 decibels. Analysis of results showed that, on the average, the ten subjects did 0·96 per cent more work in the 'less noise' weeks than in the 'noise' weeks. But the authors further qualify this result by saying that "the possibility must be admitted that the superiority of performances generally observed during the quiet weeks was partly due to favourable atmospheric conditions." This means that even the small increase of 0·96 per cent in hourly efficiency per worker may not all be due to the use of the ear-defenders.

Viteles and Smith (1946) made a laboratory investigation on the effects of change in noise levels on performance in certain specified tasks. The experiment was done with six subjects. The task given consisted of seven tests, all sufficiently complex, but some predominantly mental in nature and others of a motor variety, *e.g.*, a mental multiplication test, a lathe test and the like. The tasks were performed under three different artificially produced noise levels of 72, 80 and 90 decibels. The results show that: (*i*) there was "no marked changes in terms of pulse rate and oral temperature associated with changes in noise level" and (*ii*) "that performance on tasks such as those used in this experiment is not adversely affected by a rise in the noise level to 90 dbs."

Pollock and Bartlett (1932) did another series of experiments on the effects of noise on non-auditory performance at the Cambridge Psychological Laboratory. Different types of laboratory produced noises were used. The loudness level ranged from 40 decibels to some 80 to 90 decibels at the upper limit. The tasks given were of two types: (*a*) manual task involving simple motor skill and (*b*) simple 'mental' work, namely, word-making test. The authors conclude that "on the whole all the experiments agree that noise in general tends to produce a slight and readily recoverable diminution of efficiency. We think that its direct effects upon non-auditory performance are commonly greatly exaggerated."

Another study, similar to the one by Weston and Adams, was done by us and reported elsewhere on weavers in a Calcutta jute mill. The normal noise level in the weaving shed of this jute mill was 97 decibels. Its effect on working efficiency was gauged by making the subjects work under a quieter condition of work and comparing this efficiency with efficiency under the noisy condition. The reduction of noise was effected by the workers using the Mallock-Armstrong ear-defenders. A comparison of the mean hourly efficiency in the 'noise' and the 'less noise' weeks shows that the different workers were reacting to the reduction in noise in different ways. Four workers got an increase in output (range—2 to 0·6 per cent efficiency) and each of the other four got a decrease (1·49 per cent to 0·61 per cent efficiency). Three of these differences, one positive and two negatives, were statistically significant. The group did on the average 0·11 per cent more work while using the ear-defenders. Elimination of humidity effect raised this to 0·16 per cent per hour but even then it was not statistically significant. The authors therefore conclude that high factory noise to the level of about 100 decibels is not a serious handicap for the workers in the jute industry except for a definite few who, for some undefined reasons, may be specially susceptible to these ill effects.

In another study, Obata (quoted by McCord *et al.*) tested children and adults for their efficiency in mental work by making them add and mark out certain Japanese letters out of a confused jumble of 1,600 letters. Various types of noise, musical and non-musical, were used as distractions. In every case it was found that working speed rather than accuracy was reduced.

The above studies, much that they may differ amongst themselves as regards the finer points of interpretation, make it clear, nevertheless, that any noise much below the 100 decibel mark does not affect substantially the efficiency of the normal factory worker. Some other studies, where some reduction in the noise in the workplace lead to rather spectacular increases in efficiency should be regarded as special cases wherein perhaps the noise was not the only factor responsible for this increase. This is specially true of those studies where the reduction in noise was effected by transferring the workers from one noisy place to another—a less noisy place.

When is Noise a Health Hazard

It is a very complicated question to give a definite answer.

It has been shown that exposure to loud sounds over a long period results in impaired hearing. In certain cases it also leads to reduced productivity. What is the dividing line between innocuous and hazardous noise? To determine this not only the noise factor but other factors pertaining to

the specific workshop and the workers should also be taken into account. The noise itself acts by intensity, pitch and tone.

(i) *Intensity.*—Authorities differ as regards at what intensity level the noise becomes injurious. While Bunch (1947) would place this level above 90 decibels, McCoy prefers it at 100 decibels and above and Davis contends that there is no proof that noise below 115 decibels leads to any permanent impairment of hearing. Grove (1949) sums up the above views with the comment that "for its effect on the hearing function one can, however, safely disregard noise of less than a 90 decibel level....." This view seems to be fairly realistic and in the absence of any new evidence, cannot be seriously challenged.

(ii) *Pitch.*—Pitch is another important and harmful factor in noise. High pitched and very shrill sounds though not very loud, tend to produce more lesions than the low deep sounds. The shrill whistles of the steam locomotive is definitely more painful to the ear than the deep sounds of the mellow horns in some of their newer models. Of the two, intensity and pitch, which is more injurious is a controversial point. Some experts believe the frequency to be the more important factor, but others again, for example, Dickson and Chadwick (1950) in their study of the symptoms produced by ultrasonic sounds from jet propelled aircraft, regard amplitude to be more injurious. In the production of mental fatigue again, McCord *et al.* think that pitch is as important as intensity of the sound. Most probably, however, intensity and pitch work together, each helping and modifying to a great extent the effect of the other. Certain tones, again, when combined with pitch make some noises particularly disagreeable, especially for people of somewhat nervous temperament. The rasping or rattling sounds of flints or the grating of files are examples. Presence of bone-conducted vibrations furthers these damages.

(iii) *Intensity and pitch in relation to the specific job efficiency.*—To determine the minimum intensity and frequency level at which the noise starts lowering the efficiency of the worker is still more difficult. For as Bartlett (1934) says, "the disturbing or distracting effect of sound, when an observer is engaged upon some special task, is not a function of the noise itself but of the noise in relation to the task." This statement may further be modified and it can be said that the disturbing effect of noise is a function of the noise in relation to the task and the worker. Examples may be given from the results of Viteles and Smith's study where some subjects actually increased their efficiency when the noise level was raised from 72 decibels to 80 decibels and more. On the other hand, examples are not wanting when increase in efficiency was achieved by a decrease of, say, 10 decibels in the existing 50 decibel noise in an office (*e.g.*, Laird—quoted by McCord *et al.*). But realising the inevitable presence of some amount of noise in a factory and the difficulty of totally suppressing it and also realising that the few investigations done on this problem do not show a very large drop in efficiency due to the presence of noise of about 95 decibels, a factory noise below the 90 decibel mark may be disregarded for their effect on industrial efficiency. But from the point of view of the comfort of the worker, the quieter it is, the better. Actually, any noise above 50 decibel mark tends to attract attention and consequently causes annoyance and often irritability.

(iv) *Other factors.*—In considering the question of when noise becomes a hazard, there are other factors relating to the work and the worker which should also be considered. These are (*a*) the total time and periods of exposure, (*b*) the nature of the sound, whether continuous or intermittent, and the length of the interruption, (*c*) the type of space and environment where the work is done, (*d*) the age and sex of the worker and (*e*) the physical and emotional make-up of the worker. Exposure to loud noise initially affects hearing for high tones only but "the longer the exposure, in the range of frequency concerned in speech." (Grove—1949). Again long continued exposure to annoying or fatiguing sounds may also lead to a neurasthenic or psychasthenic state. Noises that are uncertain and irregular as to their moment of production are more harmful as well as disturbing than continuous noise of the same type. This disturbance and distraction however is not only due to the loudness of the noise but may be due to the 'interesting' nature of the sound, as, for example, with 'soft' music. Adaptation to such noises is also more difficult to arrive at. Carozzi thinks that sudden short loud noises, if they occur at longish intervals, have "very disagreeable effect on the nervous system." This sound is prolonged by reverberations if the walls and ceiling surfaces of the shop are highly reflecting. Resonance is another factor to be taken into account. Thus, the man who does the hammering inside the boiler is more adversely affected by the noise than the other worker who is working outside the boiler in the open. Another factor is individual difference in sensitivity to high noise and consequent susceptibility to its ill effects of impaired hearing, increased fatigue and loss of efficiency. This sensitivity may have something to do with age, for, as Grove suggests, "The ears of the young are probably more susceptible than those of middle or advanced age." It may be due to the sex of the worker; for example, Sabine (1944) suggests that women should be kept away from jobs where noise is excessive. It is also believed that lowered physical and nervous health, improper social and emotional adjustment increase the worker's irritation and fatigue caused by continuous loud noise. Workers already suffering from some disease of the auditory apparatus or predisposed to these diseases are more liable to injuries from high noise than otherwise. The importance of certain intercurrent diseases like syphilis or of the effects of toxic substances like dust or soot and even of excessive changes in temperature and pressure are again by no means negligible.

Prevention of Noise

Noise thus causes not only deafness but also undue fatigue, mental and physical. In factories, noises arise from endless variations. And for most of these noises there are remedies, may be unconventional but often very effective. Speaking of noise abatement in general, however, utter and absolute silence is never its objective, except in some special cases, like certain acoustical laboratories. Actually, total absence of sound is rather disturbing. On the other hand most authorities agree that noise becomes annoying and irritating only when it goes beyond the 50 decibel level. Consequently, a low background sound of 20 to 30 decibel may be regarded as the comfortable optimum (McCord and Goodell—1943). The abatement of noise may be dealt with under two headings: (*i*) measures applicable to work and working conditions and (*ii*) measures applicable to the workman.

(i) *Measures applicable to work and working conditions*—These measures essentially aim at the elimination or diminution of noise at the source. This is the most satisfactory way of tackling the problem and although initially rather costly, in the long run it proves more economic. In a factory, the chief source of noise is the running machine. In most machines, when running, some sort of noise is inevitable. But often worn parts, improper lubrication etc., greatly aggravate this noise. Proper maintenance thus not only increases their efficiency but also reduces much of the emanating noise. Whenever new installations are made, care should be taken to purchase the most well-balanced and well-designed models, and if available, the 'silent' models. Vibrations and noise may be further reduced by isolating these machines in special sound-proof rooms or by arranging them on bases of special sound-absorbing materials or on special foundations. Another method is to substitute for a noisy process, a similar but less noisy operation, like substituting impact rivetting by pressure rivetting.

Further reduction in noise may be effected by covering the floors, walls, ceilings, etc., with special noise absorptive materials. Ordinarily, the reduction of noise by these methods is of the order of 5 to 10 decibels, but even this, depending on the nature of the noise, may mean a 30 to 50 per cent reduction, which is not negligible. Wireless broadcasting studios use this method quite successfully. Noise privacy may also be achieved by incorporating certain architectural features in the construction of the buildings. Special mention may be made of the walls. These should be so designed as to prevent transmission of sound from outside and between rooms. It has been found that walls constructed of materials of high density and mass are not easily set into vibration and hence do not become secondary noise sources. In designing rooms, the 'focusing effect' should be reduced to the minimum. Air-conditioning the building also gives protection from extraneous noises, mainly due to the closure of windows and doors. The actual reduction is expected to vary from 5 to 30 decibels with an average of 10.

Above are some of the points mentioned in connection with the general problem of noise abatement in factories and offices. Before, however, a noise-reduction programme is started by any industrial establishment, "it is necessary..... to determine the origin of the noise, its intensity, its pitch, and rhythm and local circumstances which increase the vibrations by which it is accompanied." Only then can this problem be tackled and often tackled effectively.

(ii) *Measures applicable to the workman*—Where the sound level is deemed high enough to cause loss of hearing (and perhaps of efficiency) to the workers, usually in the region above the 100 dbs. mark, and cannot be successfully eliminated at the source, the workers should be given special protection. The best way to prevent the injurious noise from entering the ear is the use of ear-protectors. The ordinary ear tampon of compressed wool, or cotton steeped in some substance like glycerine or plasticine may be used or some of the more reliable ear-protectors available in the market. The authors had used the Mallock-Armstrong ear-defenders on some Indian jute weavers. These defenders cut down high noise, but allow low sounds in, thus making conversation possible with the defenders on. Every worker using it reported it to be quite comfortable. But the job, as it is with almost every protective device, is to get the worker to wear them. Here is where education and propaganda become important. And if the factory management and workers' union join hands in this campaign there is a very good chance that the workers may become noise-conscious and use protectors as a matter of routine. In any group of workers there are always some, who are especially susceptible to the ill-effects of noise, both as regards their auditory acuity (Grove) and as regards their productive efficiency (Ganguli and Rao), the causes for this high sensitivity being not always known. There may be others also who should not be exposed to the additional hazard of loud noise like those suffering from some disease of the auditory apparatus, or predisposed to such disease. Women workers, by virtue of their sex, should be given a less noisy form of employment. From the psychological point of view also, those who are very much maladjusted or suffering from some sort of functional disorder should best be given as quiet a working environment as possible. It is desirable, therefore, that such workers are transferred to a less noisy form of employment. These precautions can be taken only if there is a preplacement medical examination of every worker, followed by a periodical medical examination of workmen in noisy occupations and facilities for treatment of any injury from high noise. A better and more scientific organisation of work leading to change of shifts in noisy work, to regular rest pauses, etc., also does much to mitigate this evil.

Anti-Noise Legislation

In a capitalistic system of economy, the best safeguard against an industrial hazard is to convince the industrialist that the factor in question is a liability for him. But the noise factor is peculiar in that it is not always clear to the industrialist the way he is losing money as his workers are losing their hearing. At least that is the position with most of our Indian industrialists. Obviously then, the next best thing is for the state to recognise officially noisy industries as dangerous industries, declare loss of hearing due to noise in the shop as an occupational disease and allow compensations for the loss. A beginning may be made with metal and textile industries and railway and telephone services. Hearing loss is a compensable disease in thirty-three States of the U.S.A. (Grove—1949). In the U.S.S.R. as well diminution of hearing due to lesion of the internal ear is compensable for weavers, coppersmiths and nail manufacturers (1934) and in Germany for metallurgical workers (1934) (Carozzi).

At the same time the maximum permissible level of noise for all newly constructed factory buildings should be laid down by law. Naturally, this limit will vary from industry to industry.

Summary

The problem of industrial noise is discussed.

The problem has been defined with actual examples from Indian and foreign industries and the various effects noise has on the industrial worker discussed. An attempt has also been made to determine the various factors and especially at what intensity level the noise becomes a hazard for the worker. Some of the more well-known preventive and protective devices have been mentioned.

A suggestion is made that loss of hearing from factory noise be declared a compensable occupational disease in India.

SPECIAL CONFERENCE NUMBER

It has been decided to bring out a *special issue* of the Journal of the Indian Medical Association *in the last week of May, 1952*. This special number will contain the deliberations of the third Commonwealth Medical Conference held on the 20th, 21st and 22nd March, 1952 in Calcutta under the presidency of Hon'ble Dr. B. C. Roy, and also of the 28th All India Medical Conference held at Ahmedabad in February, 1952 under the presidency of Dr. T. S. Tirumurti. This special issue will have a circulation of 17,000 copies covering not only the whole of India, but also the commonwealth countries abroad. For details please write to the Hony. Secretary, Journal of the Indian Medical Association, 23, Samavaya Mansions, Calcutta 13.

EDITOR, *J. Indian M. A.*

NOTES AND NEWS

MEDICAL CARE UNDER THE INDIAN EMPLOYEES' STATE INSURANCE SCHEME

The Indian Employees' State Insurance Scheme sets out to provide for the first time in India not only cash benefits in case of sickness, maternity and employment injury but also medical care of a reasonable standard for each insured worker.

The Scheme is being applied from February 24, 1952, and independent State Insurance dispensaries are being established—ten in Delhi and thirteen in Kanpur for the exclusive use of insured persons.

Under this Scheme each insured person is asked to make a choice of the dispensary and an Insurance Medical Officer will have 2,000 to 2,500 insured persons on his list. The patient will be going to the same doctor from time to time. This will not only enable the relationship between doctor and patient to develop on a personal, friendly basis but will also help the doctor to acquire greater knowledge of the patient's constitution.

No charge whatsoever will be made for necessary medicines, drugs, dressings and injections. Another feature of the Scheme is that Insurance Medical Officers have collective responsibility to all insured persons whether they are allotted to them or not. In case of emergency an insured person can take free treatment from any State Insurance dispensary on production of his Identity Card.

In case of employment injury the attendance of Insurance Medical Officer and necessary hospital treatment is free; but provision is also made that an employer will provide emergent treatment and transport facilities immediately, any reasonable expenditure incurred by him being reimbursable.

Out-patient service at dispensaries will be supplemented by domiciliary service, *i.e.*, home visits by the doctor whereever a patient in unable to come to the dispensary. Nurse-midwives will also visit the sick to advise about health matters and will also attend all insured women in confinement. There is no charge for these home visits.

The need of extending the scope of medical care to families is felt not only by the employees themselves but also the employers and the Corporation. The Act provided for the extension of medical care to families in due course.

The question of adequate hospital facilities to workers is of first importance. The present hospital accommodation is, far from adequate. The State Government authorities have, however, issued instructions to their hospital authorities to admit insured persons in all cases of emergency, by creating extra beds, if necessary.

MANUFACTURE OF ISOTOPES
NEUTRON GENERATOR FOR TATA INSTITUTE

The Atomic Energy Commission will instal at the Tata Institute of Fundamental Research in Bombay this year a high powered neutron generator for the manufacture of radio-active isotopes for distribution in this country for radiotherapy and research, said Dr. H. J. Bhabha inaugurating the sixth Indian Congress of Radiology recently.

Referring to the recent developments in the field of radiology and hazards in the research, he said that the protection of those engaged in the research from the effects of radiation was receiving serious attention. People reacted differently to the same dosage of radiation and devices had been introduced to detect the actual extent of the effect. Radiation might result in the destruction of blood cells or superficial burns or anæmia.

Dr. S. N. Deboo, President of the Indian Radiological Association for the year, addressing delegates from all over the country said that the number of radiologists in India was extremely small. With only three or four medical colleges for post-graduate training in radiology it was very difficult to have qualified radiologists in adequate number. There should be a radiologist for every 10,000 of the population.

Pulmonary tuberculosis and carcinoma were the two scourges in the country just now, he stated, adding that the alarming increase in the pulmonary T.B. among the poor and middle classes would never cease unless the Government provided facilities for early diagnosis of the disease. It was necessary that all Government hospitals and municipal dispensaries should be instructed to screen the patients free or at a nominal charge those who could afford to pay. Mass radiology should be used wherever possible to detect cases in factories and mills.

Dr. Deboo further stated that similar attention should be paid for the early detection of cancer, as there lay the

only chance of cure. To wait for the appearance of glands or metastases or loss of weight to confirm the diagnosis was simply "asking for a fatality."

He suggested that an x-ray electrical industry should be started in this country, the Government giving it a priority.

FIGHTING T.B. IN INDIA

NATION-WIDE B.C.G. CAMPAIGN LAUNCHED

A nation-wide B.C.G. vaccination campaign for fighting tuberculosis in the country has been launched in India jointly by the World Health Organisation and the United Nations Children's Fund.

The campaign which is expected to last for over three years to cover the total population of children and young adults in India has already been started in Madhya Bharat, East Punjab and Uttar Pradesh; thirty eight vehicles costing about 70,000 dollars have recently arrived in India for this purpose. Medical equipment, transport and necessary materials for the campaign have been supplied by the U.N.I.C.E.F. while experts for training the local team in B.C.G. vaccination techniques have been provided by the WHO.

The campaign will also be spread within this year to PEPSU, Travancore-Cochin and West Bengal and probably in Delhi, Bombay, Bihar and Hyderabad. In 1953 the B.C.G. vaccination on a mass scale will be introduced in Jammu and Kashmir, Madhya Pradesh, Madras, Mysore, Orissa, Saurashtra, Vindhya Pradesh and Rajasthan.

The latest progress reports of existing B.C.G. campaigns show that in Madhya Bharat 518,586 persons have been tested with tuberculin and 132,404 vaccinated. In the Punjab and Uttar Pradesh the figures for tests and vaccinations are 957,207 and 958, 016 and 326,078 and 255,362 respectively. About 300 doctors and vaccinators are already engaged in B.C.G. vaccination work in different parts of India.

Tuberculosis experts both in India and abroad are said to be agreed that the energetic expansion of mass B.C.G. vaccination campaigns during the next few years is an essential first step in the attempt to control tuberculosis by cutting down new cases to a point where it will become increasingly practicable to employ the more expensive control methods aimed at neutralising the sources of infection by isolation and treatment.

COMMONWEALTH AND EMPIRE HEALTH AND TUBERCULOSIS CONFERENCE

The above conference will be held in London from the 8th to 13th July 1952. It is open to all interested in preventive medicine, including the medical and veterinary professions, commercial and industrial executives, nurses, social workers, health administrators, members of public authorities, regional hospital boards etc. Representatives from Australia, Belgium, Canada, Fiji, France, Gold Coast, India, Jugoslavia, New Zealand, South Africa, Trinidad and the U.S.A., have already arranged to attend this conference.

Interesting subjects for discussion include protective vaccination, contemporary ideas in the management of the tuberculous patient, the social worker and the tuberculous family, the patient in industry and tuberculosis in British colonial territories. Amongst those who have already promised to speak are Dr. G. C. Brink, Department of Health, Ontario, Canada, Dr. B. A. Dormer, Chief Tuberculosis Officer, Union of South Africa, Dr. J. B. McDougall, World Health Organisation, and Mr. T. Holmes Sellors, Thoracic Surgeon, London.

A new feature of the Conference will be special smaller gatherings for those with particular interest, at which appropriate subjects will be discussed. Receptions for delegates are being held at many well-known institutions, and a large number of visits to hospitals and sanatoria have been arranged in addition to tours of general interest.

All information can be obtained from the N.A.P.T., Tavistock House North, Tavistock Square, London, W.C. 1.

ANIMAL NUTRITION

In course of his inaugural speech on the occasion of the opening of the Animal Nutrition section at the Institute of Agriculture, Anand, on the 1st February 1952, Dr. Jivraj N. Mehta said "A balanced diet which alone can provide all-round nutrition, requires foodstuffs other than cereals. Thus, any agricultural policy to be sound and beneficial should also concentrate on the supply of foods, which directly originate in animals. The problem of improving and maintaining the nutritional status of animals is thus of prime importance to man; for, the care taken of the animals will ultimately be reflected in the increased supply of the protective foods required by man. Any plan, therefore, intended for the final solution of the food problem in our country should take into consideration the needs of both the human and animal population. The opening of Animal Nutrition section in an agricultural institute such as the present one is, therefore, very opportune and a move in the right direction.

"The role of the science of nutrition lies in finding out the best food for producing the desired result, the most economic utilisation of the available feeds, the discovery of new feeds or new sources of foods and the scientific processing of poor foods to improve their feeding quality. The Nutrition Advisory Committee of the Indian Council of Medical Research has recommended a balanced diet for the Indian population. Based on the proper understanding of the problems of human nutrition and animal nutrition, attempts should now be made to integrate our efforts towards meeting the nutrition of both."

REHABILITATION OF BAYER LABORATORY

An interesting lecture was given by Dr. A. G. Brooke to the members of the medical profession at the Institute of Foreign Languages, Bombay, on the 20th February, 1952. Mr. Brooke threw light on the activities of the Bayer Factory after the war. Though the factory itself hardly suffered any damage during the war, all communications to it were absolutely cut off owing to the dislocation of road and rail traffic. Strenuous efforts were, however, made since then, to make all essential supplies available to it and the present position is that the Bayer factory in Leverkusen is now exceeding its pre-war level.

CORRESPONDENCE

The Editor is not responsible for any views expressed by contributors

THE PRE- AND POST-OPERATIVE CARE OF THE PATIENT

Sir,—The healthy patient presents no great difficulties either as regards pre-operative care or rapid and successful convalescence. The position is different when disease has already caused an appreciable deterioration in the general condition or when an operation of long duration with much trauma is to be performed. In these cases success depends entirely in a very large part on careful and sincere attention before, during and after the operation.

Factors in the evaluation of individual prognosis:—In their exposition the surgeons point out that in these days age no longer plays an important role in the decision for or against surgery. Even major operations are well tolerated by infants and old aged people provided they have been adequately prepared. Organic cardiac disease does not contraindicate necessary surgery in cases where the blood pressure is not too elevated or high. Of much and special importance is good renal function; the pre-operative detection of albuminuria, persistently low specific gravity of the urine or an increase in non-protein nitrogen level enables countermeasures to be taken.

Optimal nutrition for the surgical patient:—Naturally ill patients often present a state of generalized malnutrition. This is attended by such dangers as deficient wound-healing, increased susceptibility to shock, delayed emptying time of the stomach, breakdown of the operation scar, decubitus ulcer, intestinal atony and increased susceptibility to infections resulting from insufficient antibody production. Therefore, such patients should be given blood transfusion and then a diet adequate in proteins and calories preferably by mouth but by other routes if and when necessary, possibly with parenteral protein hydrolysates.

Certain vitamins are of primary importance in preoperative preparation. Vitamin C is most essential for the healing of wounds and should be prescribed in doses of 1 gm. daily. B-complex vitamins are necessary for carbohydrate metabolism; 10 mg. vitamin B1 (aneurin), 2 mg. vitamin B2 (riboflavin), and 50 mg. nicotinamide should be given daily. These are particularily indicated when parenteral dextrose is being given. Vitamin K should also be administrated for its prothrombin-producing action to patients with hepatic insufficiency, lesions of the gastro-intestinal tract producing obstructive jaundice, diarrhœa or persistent vomiting. Hypoprothrombinemia should also be searched for preoperatively, especially in patients with significant gastrointestinal lesions and in cases receiving sulfonamides, streptomycin, intestinal antiseptics, in order, by giving timely vitamin K therapy, to prevent severe operative hæmorrhage.

Normal levels of hæmoglobin and other blood constituents must be looked at. Repeated blood transfusions restore the blood volume to normal and improve the prognosis for "poor risk" patients. Dehydration is combated by infusions of Ringer's solution and/or 5 per cent dextrose solution; acid base disequilibrium is corrected by the appropriate administration of sodium bicarbonate or sodium lactate.

Preparation of the gastro-intestinal tract:—Sulfonamides, streptomycin and intestinal antiseptics may commonly be used to reduce bacterial flora within the colon. If the most potent antibiotic, streptomycin, is administrated it should be given not sooner than 48 to 72 hours before operation as it rapidly loses its potency and efficiency after this period of time. The routine use of saline cathartics and enemas as pre-operative preparation must be avoided because they often lead to discomfort, dehydration and electrolytic disturbances of the patient. Occasionally a persistently constipated patient may be given mild saline cathartics during the last day or two before operation.

Care during the operative stage:—The simultaneous replacement by transfusion of blood lost during operation averts serious shock and aids convalescence. During operation fluid losses are compensated by infusions of 5 per cent dextrose solution but seldom in quantities greater than one litre. Physiological solutions are not given because suppression of renal function with retention of sodium favours the development of œdema; they are recommended however to be given 48 hours later upon resumption of normal renal function. The oral route for fluids is used as soon as possible.

Post-operative care commences the moment the last suture is placed in the wound and ends when the patient returns to his normal way of living. The advantages of early ambulation, within 24 hours, in avoiding previously feared complications are stressed. The same attention as before the operation is given to the adequate intake of vitamins (the necessity of high doses of vitamin C, 1 gm. daily, in the healing of wounds). Constant gastroduodenal suction is indispensable in the treatment of vomiting and meteorism. Suction is given as per routine only after gastric surgery and then maintained for only 24 to 48 hours. In the prevention of post-operative pneumonia the most important measure is to keep the tracheobronchial tree free of secretions during the early post-operative period, the prophylactic administration of antibiotics being summarily ineffective. I am etc.

Aduthurai, Tanjore Dt.,
5-12-51. K. GOVINDAN.

INDIAN MEDICAL GRADUATES AND THE ARMY MEDICAL CORPS APPOINTMENTS

Sir,—I wish to bring the following facts to your notice with reference to resolution No. 13 passed at the Punjab State Medical Conference and published in the Supplement to the Journal of February, 1952.

It is incorrect to say that medical graduates of foreign universities are given preference over those possessing Indian qualifications when granting Permanent Regular Commission in the Army Medical Corps. During 1951, twenty Permanent Regular Commissions were granted and all these officers were Graduates of Indian Universities. I am etc.

Office of the D. G. AFMS Sd/- Illegible,
23-2-1952. *Director General*,
New Delhi 11. ARMED FORCES MEDICAL SERVICES.

STREPTOMYCIN IN TYPHOID FEVER

Sir,—I tried in ten cases of enteric fever, the drug dihydro-streptomycine (one gram dissolved in 5 to 10 c.c. of distilled water and divided into three doses and given within twenty four hours) and found good results.

The temperature was controlled in five days, total 5 grams to 10 grams being given. After the temperature came down to normal, the drug was given for three days more and

all cases were given absolute rest for about seven days. No relapses and no other complications or toxic symptoms were noticed.

I hope, my colleagues will try this medicine in hospitals and nursing homes and will throw more light on this. I am etc.

Bilimora, Surat. C. T. MEHTA.
12-2-1952.

CLINICAL INTERPRETATION OF 'INCIDENTS' WITH EOSINOPHILIA

SIR,—I was interested to read Dr. Asoke Mitra's article on incidence of eosinophilia in the February issue of J.I.M.A. There are some points which, I feel, do require further discussions:—

(1) Surely if liver extract therapy were to influence the eosinophil count, it would seem likely that considerable variations in the number of eosinophils present in cases of pernicious anæmia could have been noted; but is there any concrete evidence of this?

(2) Is it not probable that many of the cases on records on osteomalacia showing eosinophilia are in fact caused by the infestation of intestinal parasites which could account for the eosinophilia?

(3) In this endemic area of malaria (Jalpaiguri, West Bengal) where a good number of cases of this disease is treated we could not find any case with any increase of eosinophils whatsoever.

(4) It is interesting to note the wide spread of diseases covered by the analysis of patients; but this is surely of little value without knowledge of the number of patients suffering from similar diseases who showed no eosinophilia. Furthermore there is no evidence in Dr. Mitra's paper of any secondary disease which might in some or many of these patients have given rise to the increased eosinophil count.

(5) I tried with anti-histamine drugs in a number of cases of eosinophilia and have been peculiarly unsuccessful in obtaining reduction of the eosinophil count.

(6) Regarding Dr. Mitra's statement that tropical eosinophilia is found in the "humid sea-side districts" of India, it might be of interest to him to know that in the past 16 months I have had in my own practice more than 50 cases in this plain area which is situated far away from the sea-side.

I hope shortly to record some of my experiences in this connection. I am etc.

11-2-1952.
Jalpaiguri, West Bengal. K. P. ROY.

REVIEWS

THE 1951 YEAR BOOK OF OBSTETRICS AND GYNAECOLOGY. Edited by J. P. Greenhill. The Year Book Publishers, Inc., Chicago, U.S.A. 567 pages. Price $5·00 postpaid.

Under the able editorship of Dr. Greenhill this handy year-book has very well maintained the reputation of its predecessors. The abstracts are, as usual, from a large number of journals, although predominantly of American sources, and hence can never fail to interest the reader. The Year Book of Obstetrics and Gynæcology has carved out a well earned and honoured place in the practitioner's library; the present volume ably continues the chain. The assorted "Quiz" of 20 questions is not only a good test for the enthusiastic reader, serving to stimulate his curiosity, but shows the wide variety of topics covered by the large number of abstracts comprising the Year-Book.

R. S.

THE 1951 YEAR BOOK OF GENERAL SURGERY. Edited by Evarts A. Graham, with a section on Anæsthesia, edited by Stuart C. Cullen. Year Book Publishers Inc., Chicago, U.S.A. 621 pages, Price $5·00 post paid.

It is never an easy matter to cover the entire field of general surgery, prepare suitable abstracts and then offer them to the reader in a small and compact hand-book as the Year-Book. But the editor has well done his difficult task and deserves congratulations on the achievement in making this yearly volume on general surgery, once again, a much awaited and eagerly accepted volume. The entire subject has been dealt with in convenient 33 chapters for easy appreciation and reference. The subject of Anæsthesia has also been nicely presented in nine small chapters containing abstracts of interesting articles from various journals. The comments of the editor, in both the sections, make the abstracts more interesting to the readers. Get-up, binding, type and printing conform to the high standard of the other Year Books.

MEDICAL DISORDERS OF THE LOCOMOTOR SYSTEM INCLUDING THE RHEUMATIC DISEASES—By Ernest Fletcher, Second Edition 1951, pp. 884, Published by E. & S. Livingstone Ltd., 16 Teviot Place, Edinburgh. Price 60 s.

This is an excellent treatise with exhaustive study of the different diseases of the locomotor system. The book consists of 39 chapters, starting with a classification of the rheumatic diseases and a chapter on clinical examination of a patient suspected of some locomotor disorder—a most useful chapter. A wide number of diseases has been incorporated, to mention a few—rheumatic fever, rheumatic arthritis, fibrositis, osteoarthritis, gout, neuropathies, backache and spondylitis. Every disease has been carefully considered in all its aspects. There are detailed descriptions on anatomy and physiology of the bones and joints, and radiography in arthritis, ACTH etc., have been exhaustively dealt with in appendix.

In the chapter on the treatment of rheumatic arthritis, when describing gold, there is a statement "Toxic reactions are almost unknown when cases are thoroughly and continuously supervised" on which there may not be universal agreement.

The book has been profusely illustrated. Printing and get up are of high order. The author deserves warm congratulations for presenting such a useful volume to the medical profession.

S. C. C.

1951 YEAR BOOK OF MEDICINE. The Year Book Publishers, Inc., 200 Illinois St., Chicago 11, U.S.A. Price $5·00 Pp. 696.

One finds difficult now-a-days to keep pace with numerous advances in the different fields of medicine however earnestly one may so desire. Scores of such significant advances have been detailed in the 1951 year book of medicine much to the advantage of members of the medical profession. The book has been divided in five parts *e.g.*,

Infection; The chest; The Blood and Blood Forming Organs; The Heart and Blood Vessels, The Kidney, and The Digestive System. More recent works and views on the different subjects have been discussed. The editorial remarks here and there will be much appreciated by the readers. The book has maintained its usual high tradition and should find a place in every doctor's book shelf.

S. C. C.

DESIGN FOR SANATORIA, 1951. REPORT OF THE NAPT ARCHITECTURAL COMMITTEE. Pp. 124. Published by National Association for the Prevention of Tuberculosis. Tavistock House, North Tavistock Square, London W. C. 1, England.

The book is a report of the architectural committee of the NAPT and deals with the modern ideals about the designs and construction of sanatoria and chest hospitals. Along with the architectural problems various other related questions in connection with the functions of a modern sanatorium or chest hospital have been dealt with in 40 chapters. A special chapter has been devoted to "The Design of Sanatoria for Tropical and Semi-Tropical climatic conditions." The book will be of immense value as an authoritative guide to those who are in charge of hospital planning in India. A number of excellent photographs illustrating various departments of modern sanatoria in different countries have been included. There are also a number of plans.

P. K. C.

NAPT HANDBOOK OF TUBERCULOSIS ACTIVITIES IN GREAT BRITAIN AND THE COMMONWEALTH. 13th Edition 1951. Pp. xi + 370. Edited by Harley Williams M. D. Published by the National Association for the Prevention of Tuberculosis. Tavistock House North, Tavistock Square, London, W.C. 1, England.

The book is a complete directory of hospitals, sanatoria and clinics, regional hospital boards, and hospital management committees, and of tuberculosis services in the British Commonwealth. Changes that had undergone in the old tuberculosis service since the introduction of the National Health Service Act (1946) in England have been presented. The book will be useful to all those who are concerned with the anti-tuberculosis work and administration.

P. K. C.

OBSTETRICAL PRACTICE—By Alfred C. Beck. Fifth edition, 1951. Pp. xiv + 1073, with 947 figures. Bailliére Tindall & Cox, London. Price 76s. 6d. net.

The first edition of this book appeared in 1935 and it has run on to its fifth edition in 1951. This fact alone speaks highly of its popularity. In this edition the whole text has been brought up-to-date by inclusion of the accepted and proved modern concepts on various subjects; several chapters have been entirely re-written; many new diagrams and figures incorporated, a few old ones have been discarded. The whole text has been amply and very well illustrated by a large number of expressive figures. The descriptive text has, in many places, been very usefully curtailed by figures, illustrations and appropriate legends under them. The "pictorial summaries" of the mechanisms of labour in various presentations make the text much more easy to the student to understand and remember, the various points in their proper perspectives. The plentiful illustrations and figures used to describe the various obstetric procedures are very helpful. The large number of references at the end of each chapter serve to stimulate and help the advanced student and the practitioner in further and detailed studies on the various subjects. An excellent text book for the undergraduate student and a good stand-by for the practitioner.

R. S.

DENTINDIA (Annual Dental Journal), 1951.

This annual volume has been published in collaboration with the Students' Union, Calcutta Dental College & Hospital, and runs into 134 pages. It contains a large amount of reading material including some articles contributed by authors abroad. There are some very good articles and a large amount of informations of topical interest collected from a variety of sources. Excepting for some minor defects in editing and a few "printing mistakes" this annual volume has been very well produced, and the Editorial Board deserves compliments for this production.

R. S.

YOUR QUESTIONS

Correspondents should give their names and addresses (not necessarily for publication) and include all relevant details in the questions which should be typed. Questions of medical interest only will be acceptable for this section. They should be sent in a separate envelope marked "Your Questions." Questions of general interest will be published in preference. Lack of space precludes answering all the questions received.

Q. "What is the safe and sure method of family limitation? What interval in the menstrual cycle of a woman is the safe period according to latest understanding of this subject and are there any available facts and figures in India regarding its application and results thereof?"

Ans. There is no method of family limitation, which is absolutely safe and perfectly sure—except the well-known method of "abstinence" during the interval. This, however, is not practicable for the common man. Dr. Abraham Stone has obtained a high percentage of success with the use of his "rhythm" method. But even with his own observations, a 100 per cent success is not obtained by following the "rhythm" method alone. For all practicable purposes, the safest and surest (although there may be occasional failures for various reasons) practical method is to rely on "double protection"—a mechanical barrier along with a spermicidal chemical. Various spermicidal chemicals in jelly basis, made by reputable firms are available. Regarding the first objective of a mechanical barrier, the male sheath or condom is widely used, cervix caps of various types are also in use, though less often. It is better to use contraceptives by both the partners. The diaphragm type of pessary gives a better protection, but must be applied under expert supervision and by special instruments. The first four or five days, immediately following a 4 to 5 day period, are infertile. So also are the four to five days immediately preceeding the menses. But in cases of irregularity of menses this latter period is very unreliable. We do not know of any published figures in India dealing with this aspect of the problem.

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Schaeffer, J. R., and Pulaski, E. J.: U. S. Armed Forces M. J. 1:1447 (Dec.) 1950.

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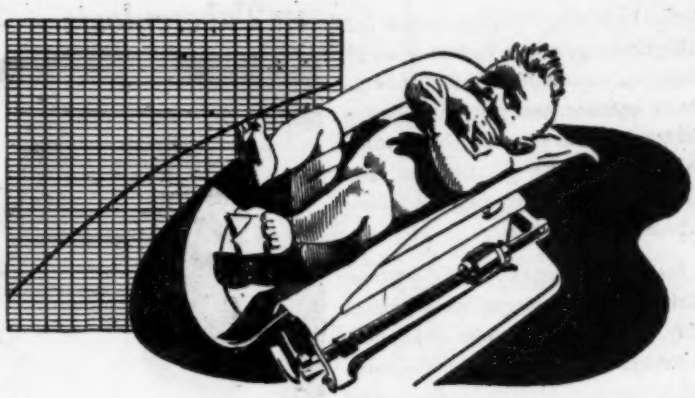

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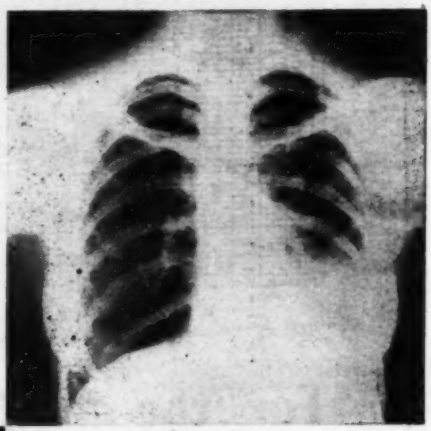

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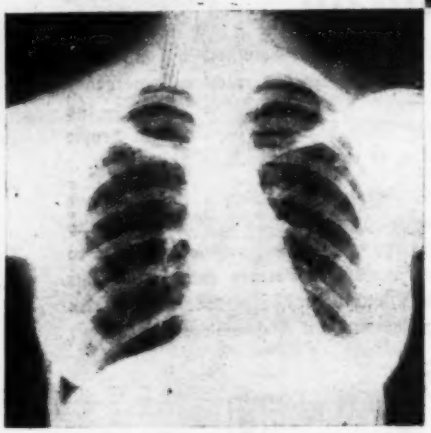

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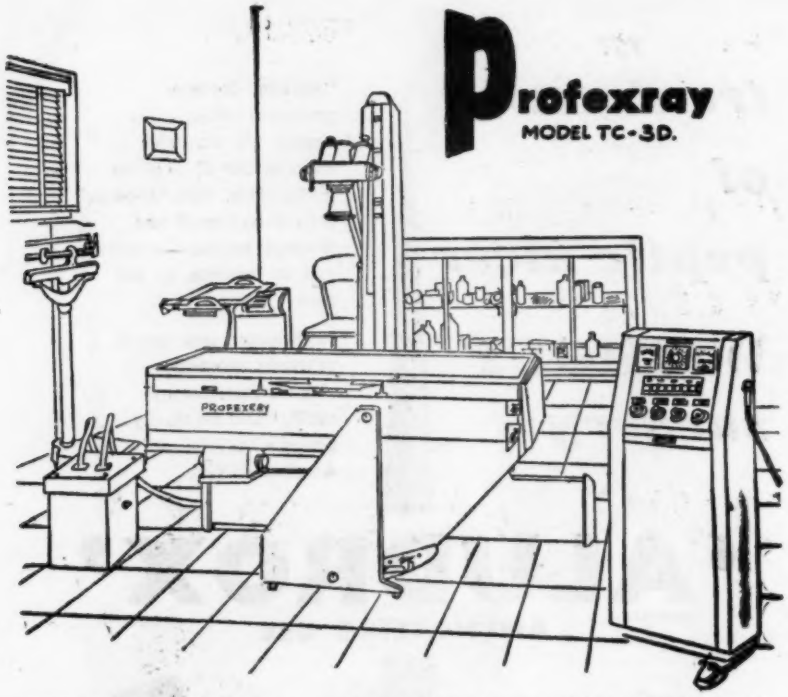

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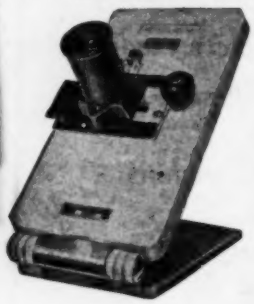

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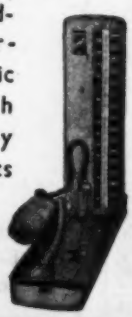

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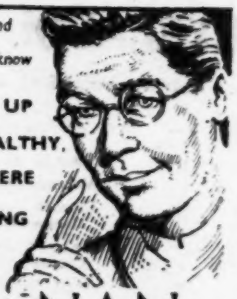

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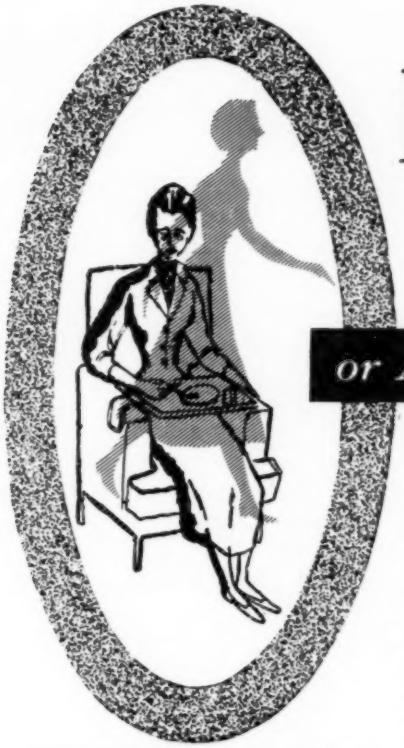

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